INSTALLATION AND OPERATION MANUAL

ASM-40

High-Speed Short-Range Modem

Version 1.0

RAD
data communications
Innovative Access Solutions

ASM-40

High-Speed Short-Range Modem

Version 1.0

Installation and Operation Manual

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To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit's use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

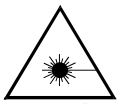
Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective earth: the marked lug or terminal should be connected to the building protective earth bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

- Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
- Do not attempt to adjust the laser drive current.
- Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
- The use of optical devices with the equipment will increase eye hazard.
- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk,

there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkströrungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Declaration of Conformity

Manufacturer's Name:	RAD Data Communications Ltd.
Manufacturer's Address:	24 Raoul Wallenberg St., Tel Aviv 69719, Israel

declares that the product:

Product Name:	ASM-40

conforms to the following standard(s) or other normative document(s):

EMC:	EN 55022: 1998	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
	EN 50024: 1998	Information technology equipment – Immunity characteristics – Limits and methods of measurement.
Safety:	EN 60950: 2000	Safety of information technology equipment.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 99/5/EC. The product was tested in a typical configuration.

Tel Aviv, 14th July, 2002

Haim Karshen

VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30, 85521 Ottobrunn-Riemerling, Germany

Quick Start Guide

Installation of ASM-40 should be carried out only by an experienced technician. If you are familiar with ASM-40, use this quick start guide to set it up for operation.

This guide describes the standalone version of the modem.

Perform the installation procedures for both the local and the remote units.

1. Installing ASM-40

Instructions given below detail the settings that you have to make in order to configure ASM-40 for proper operation. The table, which comes after the configuration instruction lists the ASM-40 DIP switches and their possible settings.

Configuring ASM-40

➤ To configure ASM-40:

1. Disconnect all the cables connected to ASM-40.
2. Locate and open a lid on the bottom panel at the rear of the ASM-40 modem.
3. Set the internal DIP switches and jumpers according to the table below.
4. Close the bottom panel lid.

DIP Switch	Function	Possible Settings	Factory Setting
EX/R and INT sections, SW4/1, 2	Select the transmit clock	**INT** – ON, internal clock. EX/R section is disabled **EX/R** – ON, **INT** – OFF, receive clock **EX/R** – OFF, **INT** – OFF, external clock	INT – ON EX/R – OFF
***Note**: When set to external clock, ASM-40 automatically configures itself to the DTE data rate, disabling SW3 (baud rate).*			
B8ZS and AMI sections, SW4/3, 4	Select the line code	**B8ZS** – OFF, **AMI** – ON, AMI line code **B8ZS** – OFF, **AMI** – OFF, HDB3 or B8ZS line code, depending on the selected data rate	B8ZS – OFF AMI – OFF
***Note**: When setting data rate to 32, 64, 128, 256, 512, 1024, 1920 or 2048 kbps, the HDB3 line coding is automatically selected. In this case the B8ZS and AMI section settings are irrelevant. The B8ZS and AMI sections are in use only if the data rate is set to 192(B8ZS only), 384, 768, 1536 or 1544 kbps.*			
SWEN section, SW3/1	Enables activation of the loopbacks and internal BERT via	**ON** – The diagnostic tests can be activated via the front panel	ON

DIP Switch	Function	Possible Settings	Factory Setting
	the front panel pushbuttons	**OFF** – The diagnostic tests cannot be activated via the front panel	
V54E section, SW3/2	Controls activation of the local digital loopback when remote digital loopback is initiated from the remote unit	**ON** – Local digital loopback activation is enabled **OFF –** Local digital loopback activation is disabled	ON
CNTE section, SW3/3	Selects the transmit carrier mode	**ON –** Carrier follows the RTS line **OFF –** Carrier is constantly ON	OFF
Note: For ASM-40 units with G.703 Codirectional DTE interface, the CNTE section (SW3/3) must be set to OFF.			
B/UB section, SW3/4	Selects the line impedance: Balanced: terminal block or DB-15 Unbalanced: BNC	**ON –** 75Ω (for 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps) **OFF** – 120Ω (for 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps)	According to the connector type
***Note**: 100Ω line impedance is set by selecting one of the following data rates: 192, 384, 768, 1536 and 1544 kbps. In this case, the settings of the SW3 B/UB section are ignored.*			
ALBE section, SW3/5	Enables local analog loopback activation from the DTE (via pin 18 for V.24, RS-530, V.36 or via pin "JJ" for V.35)	**ON** – The local analog loopback activation from the DTE is enabled **OFF** – The local analog loopback activation from the DTE is disabled	OFF
***Note**: Set this section to DIS if the DTE interface does not support the local analog loopback activation via the appropriate pin.*			
RLBE section, SW3/6	Enables remote digital loopback activation from the DTE (via pin 21 for V.24, RS-530, V.36 or via pin "HH" for V.35)	**ON** – The remote digital loopback activation from the DTE is enabled **OFF** – The remote digital loopback activation from the DTE is disabled	OFF
***Note**: Set this section to DIS if the DTE interface does not support the remote digital loopback activation via the appropriate pin.*			
SW5	Selects data rate	SW54 / SW53 / SW52 / SW51 / Rate: 0 0 0 0 2048 0 0 0 1 1920 0 0 1 0 1544 0 0 1 1 1536 0 1 0 0 1024 0 1 0 1 768 0 1 1 0 512 0 1 1 1 384 1 0 0 0 256 1 0 0 1 192 1 0 1 0 128 1 0 1 1 64 1 1 0 0 32	256

DIP Switch	Function	Possible Settings	Factory Setting
J4, CHASS	Controls the connection between the ASM-40 signal ground and the frame (chassis) ground	**CON** – Signal ground is connected to the frame ground **DIS** – Signal ground is disconnected from the frame ground	CON

***Note**: Disconnecting the signal ground from the frame ground may render the unit unsafe for connection to unprotected telecommunication networks in some locations.*

Connecting the Cables

Connecting the Line

➤ **To connect the line:**

Connect the line cable to the rear panel line connector.

Connecting the DTE

➤ **To connect the DTE:**

Connect the DTE cable to the appropriate ASM-40 rear panel connector.

Connecting the Power

➤ **To connect AC power to ASM-40:**

1. Connect the power cable to the power connector on the ASM-40 rear panel.
2. Connect the power cable to the mains outlet.

   The unit turns on automatically upon connection to the mains.

➤ **To connect DC power to ASM-40:**

Refer to *DC Power Supply Connection Supplement*.

2. Operating ASM-40

ASM-40 does not require operator attention once installed and configured.

Verifying Performance

When data is being transferred, observe that the following front panel LEDs light or blink:

- PWR: On
- RTS: On
- TD: Flashing or Off
- RD: Flashing or Off

- DCD: On
- TEST: Off.

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Appendix D. IR-IP Interface Module

Appendix E. IR-G.703 Interface Module

Chapter 1

Introduction

1.1 Overview

ASM-40 is a high speed, synchronous short-range modem operating at full-duplex over unconditioned lines. ASM-40 also functions as a baud rate and interface converter.

Product Options

The following versions of the modem are available:

- ASM-40 standalone unit
- ASM-40/R: a plug-in card for installation in the ASM-MN-214, 19-inch modem rack, holding up to 14 cards.

Power Supply Options

The following power supply versions are available:

- 100–240 VAC or -48 VDC
- 24 VDC .

Applications

Figure 1-1 illustrates the ASM-40 point-to-point interface and rate conversion application.

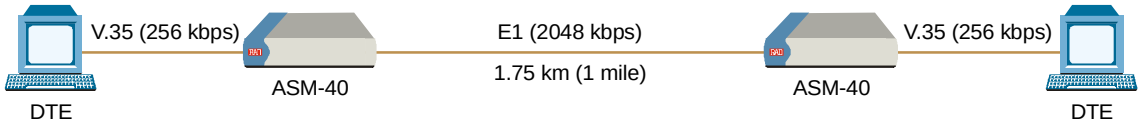

Figure 1-1. Point-to-Point Interface and Rate Conversion Application

Figure 1-2 illustrates the ASM-40 tail-end application.

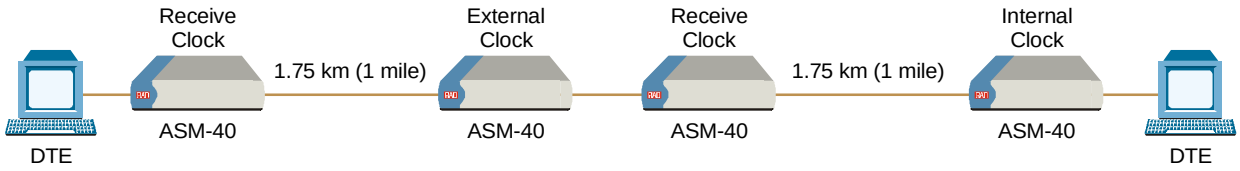

Figure 1-2. Tail-End Application for DDS Service

Features

ASM-40 operates at 13 selectable rates of up to 2048 kbps, for a line attenuation of up to 40 dB on twisted pair or coax cable. This provides an approximate operating range of up to 1.75 km (1 mile).

ASM-40 incorporates interface circuits for the terminal/computer, an automatic equalizer, a modulator and demodulator. Coupling to the line or coax cable is protected by isolation transformers, which, in conjunction with other circuitry, guard against AC or DC voltage surges. The protection circuitry enables operation even when a DC power source is connected to the line.

Zero suppression on the link is switch-selectable for either AMI, HDB3, or B8ZS coding, according to ITU G.703 standard.

DTE Interface

The DTE port has modular, field-changeable interfaces: V.24, V.35, X.21, RS-530, V.36/RS-449, G.703-HDB3, G.703 Codirectional (64 kbps), Ethernet bridge (IR-ETH), Ethernet/Fast Ethernet bridge with VLAN support (IR-ETH/QN), or IP-router (IR-IP). The G.703-HDB3 interface supports data rates of 128, 256, 512, 1024, or 2048 kbps.

Timing

Transmit and receive timing can be provided internally, or derived externally from the data terminal or receive signal. Internal FIFOs provide jitter attenuation or phase difference correction either from the incoming analog signal (line side) or from the external clock on the DTE side.

Diagnostics

ASM-40 provides local analog, remote digital and local digital loopbacks in compliance with the V.54 standard. The loopbacks are activated manually via the front panel pushbuttons. In addition, the local analog and remote digital loopbacks are initiated via the DTE interface pins (”HH” and “JJ” for V.35 or 18 and 21 for RS-530 or V.24).

ASM-40 includes internal Bit Error Rate Tester (BERT) for complete testing of the local and remote modem and the link quality without any need for external test equipment. ASM-40 runs an internal pseudo-random 511-bit test pattern in accordance with the ITU V.52 standard.

1.2 Physical Description

ASM-40 is available as a standalone unit or as a rack-mount card for the ASM-MN-214 hub. *Figure 1-3* shows the 3D view of the ASM-40 standalone unit.

Figure 1-3. ASM-40 Standalone Unit

The front panel includes seven LEDs, which display the status of power, data flow, control signals and diagnostics. Four front-panel switches control the three loopbacks and BER testing activation. For detailed description of the front panel, see *Chapter 3*.

The back panel includes a power connector (AC or DC), an interface connector, and a line connector. The ASM-40 rear panel is described in greater detail in *Chapter 2*.

1.3 Functional Description

This section contains functional descriptions of the ASM-40 circuit blocks, shown in *Figure 1-4*.

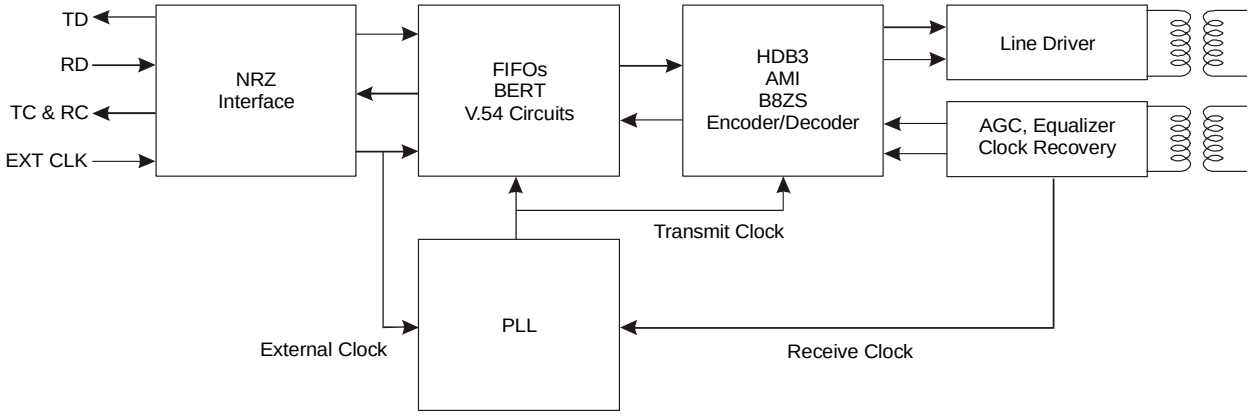

Figure 1-4. ASM-40 Block Diagram

Timing Generator

This circuit is a PLL circuit. ASM-40 transmits data to the line at the following baud rates: 2048, 1544, 1536, or 1920 kbps. The baud rates support different data rates, which enable ASM-40 to be used as a rate converter.

- 2048 kbps – 32, 64, 128, 256, 512, 1024 and 2048 kbps
- 1536 kbps – 192, 384, 768 and 1536 kbps
- 1544 kbps – 1544 kbps
- 1920 kbps – 1920 kbps.

Transmit and receive timing are derived from the following sources:

- Internal – Supplied by the internal crystal oscillator
- External – Supplied by the DTE
- Receive – Recovered from receive signal.

If the DTE interface is a G.703-HDB3 interface, then the recovered clock from this interface is used as the external clock.

Figure 1-5 shows the ASM-40 clock diagram.

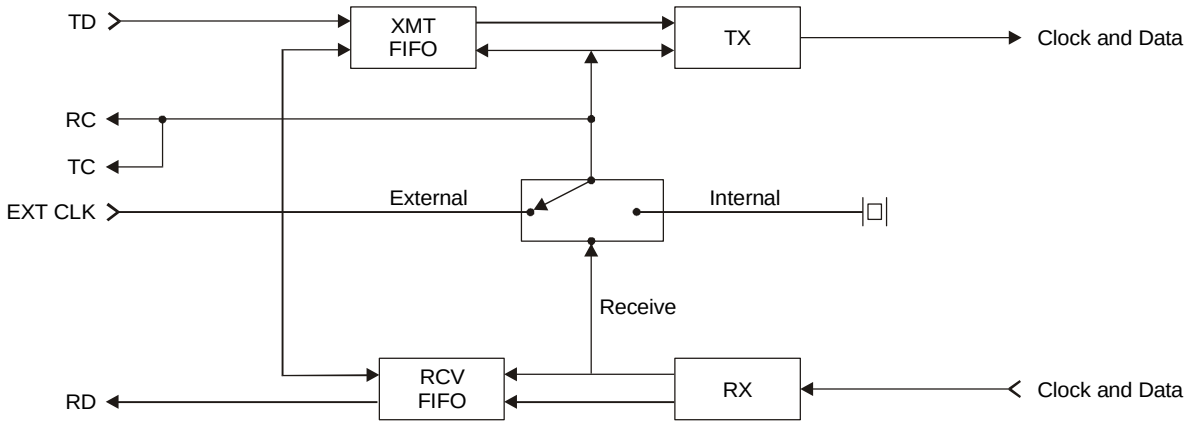

Figure 1-5. ASM-40 Clock Diagram

Figure 1-6 shows the clock configuration for ASM-40.

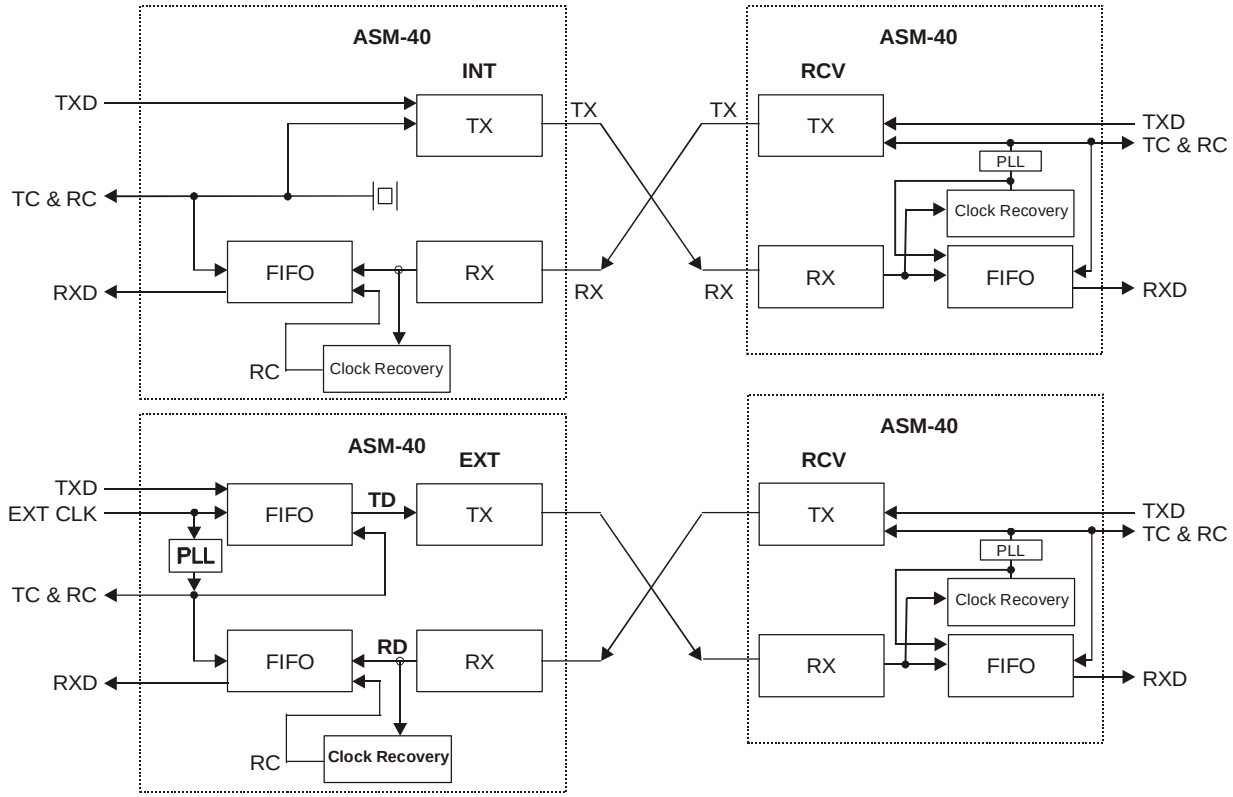

Figure 1-6. ASM-40 Clock Configuration

G.703-HDB3 Interface Timing

The received data from the analog side is output on the DTE interface with a jitter-free clock for TC & RC (see *Figure 1-7* and *Figure 1-8*). The transmit data on the analog side is the input data from the DTE interface. The G.703-HDB3 recovered clock (from the input data) is used as an input clock for the transmit FIFO, as shown in *Figure 1-7.* The same FIFO used for external clock is always present when using the G.703-HDB3 interface).

Using the internal or receive clock, provisions must be made to loop back (on the DTE side) the incoming clock (data and clock out) to the transmit data (data and clock inputs). Refer to *Figure 1-8*, for clock configuration.

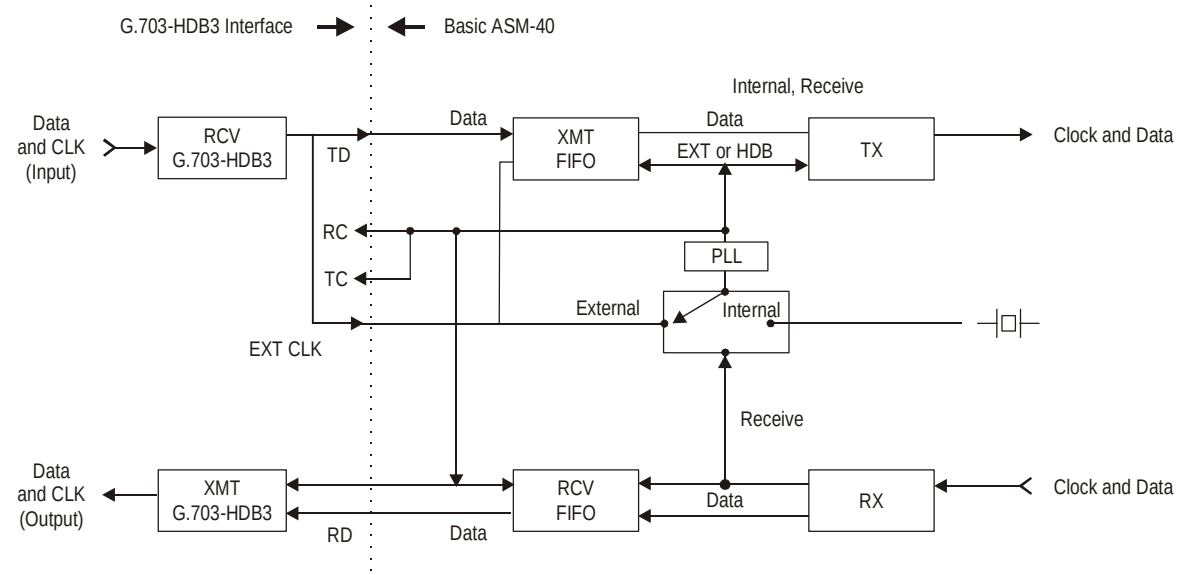

Figure 1-7. G.703-HDB3 Clock Diagram, DTE Interface

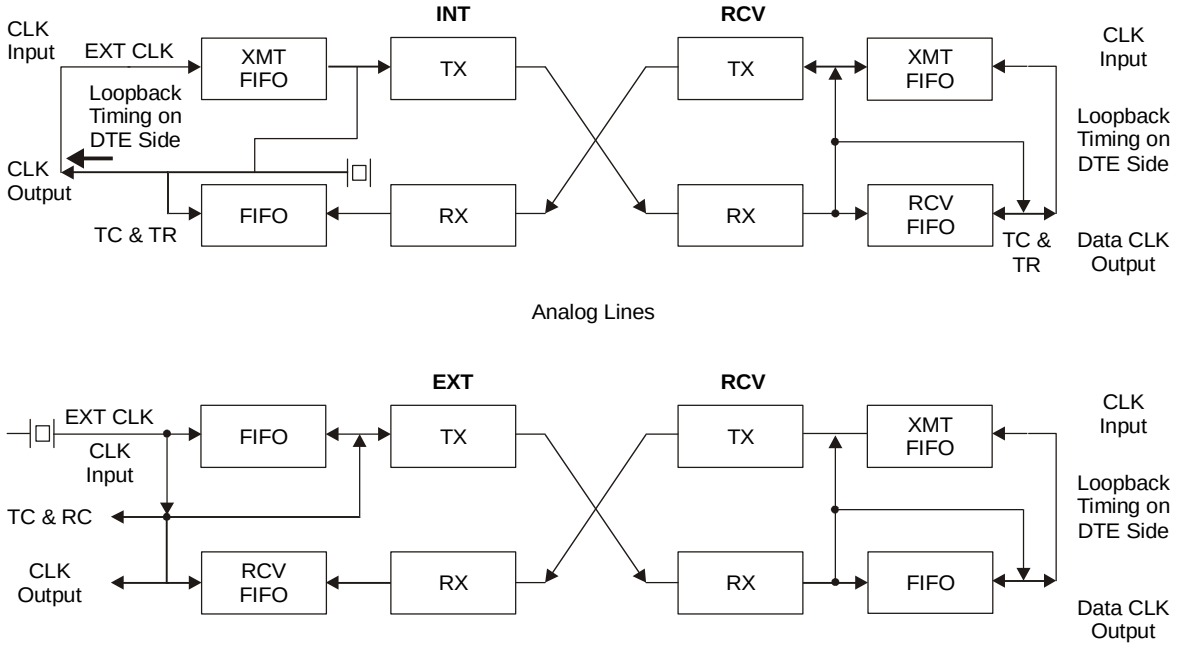

Figure 1-8. G.703-HDB3 Clock Configurations, DTE Interface

Encoder/Decoder

The ASM-40 encoder/decoder converts from NRZ to HDB3, AMI or B8ZS on the transmission side and converts back to NRZ on the receive side.

Line Driver

The line driver provides a three-level alternate mark inversion signal according to ITU-G.703 standard.

Receiver

An AGC end equalizer provides the received signal for the clock and data recovery circuitry.

NRZ Interface

The digital side provides an interface choice of V.35, X.21, RS-232, RS-530, V.36 (via adapter cable), Ethernet/Fast Ethernet bridge, or IP router.

ASM-40 can be ordered with G.703-HDB3 on the digital side, for data rates 2048, 1024, 512, 256, or 128 kbps. This enables operation as a baud rate converter or repeater for G.703. In addition, ASM-40 supports G.703 Codirectional interface operating at 64 kbps.

1.4 Technical Specifications

Line Interface

Line Type	Unloaded 4-wire twisted pair 19 to 26 AWG, or BNC 75Ω coaxial cable
Line Code	• HDB3 (1920 kbps or 2048 kbps baud rate) • B8ZS or AMI (1536 kbps or 1544 kbps baud rate)
Framing	Unframed
Transmit Level	According to G.703
Baud Rate	2048, 1544, 1536, 1920 kbps
Impedance	• 75Ω for 2048 and 1920 kbps – unbalanced (BNC coax) • 100Ω for 1544 and 1536 kbps balanced (terminal block or DB-15) • 120Ω for 2048 and 1920 kbps (terminal block or DB-15)
Return Loss	Better than 15 dB
Line Attenuation	Up to 40 dB
Range	1.75 km (1 mile) over 24 AWG wire

	Connector	DB-15 or 5-clip terminal block: • 100Ω for 1544 kbps and 1536 kbps balanced • 120Ω for 2048 kbps and 1920 kbps balanced BNC coax: • 75Ω for 2048 and 1920 kbps unbalanced
DTE Interface	*Data Rate*	32, 64, 128, 192, 256, 384, 512, 768, 1024, 1536, 1544, 1920, or 2048 kbps G.703-HDB3: 128, 256, 512, 1024, or 2048 kbps G.703 Codirectional: 64 kbps
	Signal Attenuation (G.703-HDB3 Interface)	6 dB
	Output Level (G.703-HDB3 Interface)	±3V
	Type and Connectors	• V.24/RS-232: 25-pin, D-type, female • V.35: 34-pin, female • X.21: 15-pin D-type, female • RS-530: 25-pin, D-type, female • V.36/RS-449: via adapter cable converting between RS-530 connector and 37-pin, D-type, female connector • G.703-HDB3: 15-pin D-type, female or BNC coax • G.703 Codirectional: 5-clip terminal block or RJ-45 • IR-ETH: RJ-45 or BNC coax • IR-ETH/QN: RJ-45 • IR-IP: RJ-45
Timing	*Transmit & Receive Clocks*	Derived from 3 alternative sources: • Internal oscillator • External from the DTE • Receive clock derived from the receive signal, looped back as a transmit clock

Diagnostics	*V.54 Loopbacks*	Local loopback (LLB): activated by a front panel pushbutton or by the DTE interface signal (V.24, V.35 and RS-530 only) Remote loopback (REM): activated by a front panel pushbutton or by the DTE interface connector signal (V.24, V.35 and RS-530 only) Local digital loopback (DIG): activated by a front panel pushbutton
	Internal BERT	Built-in pattern generator and tester, complies with ITU V.52
Indicators	*PWR (green)*	Power
	RTS (yellow)	Request to Send
	TD (yellow)	Transmit Data
	RD (yellow)	Receive Data
	DCD (yellow)	Data Carrier Detect
	TEST (red)	Test
	ERR (yellow)	Bit Errors
Physical	***Standalone ASM-40***	
	Height	44.3 mm (1.7 in)
	Width	214.3 mm (8.4 in)
	Depth	258 mm (10.1 in)
	Weight	0.88 kg (1.9 lb)
	ASM-40/R Card	Fits one slot in the ASM-MN-214 card cage
Power Supply	*Wide Range*	100 to 240 VAC (±10%), 50 to 60 Hz, 6.8 VA -48 VDC (-36 to -72 VDC), 5.7W
	Optional DC Source	24 VDC (18 to 36 VDC)
	Power Consumption	• AC: 6.8 VA • DC: 5.7W • ASM-40/R: 5.2W
Environment	*Temperature*	0°–50°C (32°–122°F)
	Humidity	Up to 90%, non–condensing

Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for the standalone ASM-40 modem.

ASM-40 is delivered completely assembled. It is designed for tabletop or 19-inch rack installation. For rack installation instructions, refer to the rack mounting kit for 19-inch racks guide that comes with the RM kit.

After installing the unit, refer to *Chapter 3* to assure normal operation.

In case a problem encountered, refer to *Chapter 4* for test and diagnostic instructions.

Warning

Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.1 Site Requirements and Prerequisites

An AC-powered ASM-40 should be installed within 1.5m (5 ft) of an easily accessible grounded AC outlet. The outlet should furnish 100 VAC to 240 VAC.

A DC-powered ASM-40 unit requires -48 or 24 VDC power source, which must be adequately isolated from the mains supply. In order to prevent a fire hazard, a suitable fuse should be installed in the VDC line.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of ASM-40 is 0° to 50°C (32° to 122°F) at relative humidity of 90%, non-condensing.

2.2 Package Contents

The ASM-40 package includes the following items:

- One ASM-40 unit
- Last Mile Access and Intelligent Modems CD
- CBL-530/449 adapter cable for the ASM-40 units with V.36 interface
- AC power cord or DC power supply connector kit
- RM-28 rack mount kit (if ordered).

2.3 Installation and Setup

ASM-40 is a standalone device intended for tabletop or bench installation. It is delivered completely assembled. No provision is made for bolting the unit on the tabletop.

➤ **To install ASM-40:**

1. Determine the required configuration of ASM-40, according to your application, and set the DIP switches accordingly.
2. If ASM-40 contains IR-ETH, or IR-ETH/QN interface module, you may have to open the unit's case to get access to the jumpers located on the Ethernet module (see *Appendix B*, *Appendix C* and *Appendix E*).
3. Connect the line (see *Connecting the Line* below).
4. Connect the DTE (see *Connecting the DTE* below).
5. Connect power to the unit (see *Connecting the Power* below).

Configuring ASM-40

This section describes how to configure ASM-40 for a typical application. *Figure 2-1* illustrates the DIP switch location. *Table 2-1* provides details on the functions of the ASM-40 DIP switches, and their default settings.

Warning

Make sure that the power cord is disconnected before performing the DIP switch settings.

➤ **To configure ASM-40:**

1. Locate and open a lid on the bottom panel at the rear of the ASM-40 modem.
2. Select the data rate (SW5, see *Table 2-1* for the proper switch settings).

   By selecting the data rate, you also define the ASM-40 line coding.

3. Select the line code (SW4). The line code must be the same for both local and remote units.
   - **HDB3** – Select the 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps data rate. In this case the B8ZS and AMI section settings are irrelevant.
   - **B8ZS** – Select the 192, 384, 768, 1536 and 1544 kbps data rate, and set the B8ZS section to OFF, and AMI – to OFF.
   - **AMI** – Select the 384, 768, 1536 and 1544 kbps data rate, and set the AMI section to ON, and B8ZS – to OFF.
4. Select the clock source (SW4). One of the modems should be set to external or internal clock, another modem – to receive.
   - **External** – Set the EX/R and INT sections to OFF.
   - **Internal** – Set the INT section to ON. The EX/R section is disabled.
   - **Receive** – Set EX/R section to ON, and INT – to OFF.
5. Set the line impedance (SW3). ASM-40 supports 75Ω unbalanced and 120Ω balanced impedance for 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps. Additionally, ASM-40 supports 100Ω impedance for 192, 384, 768, 1536 and 1544 kbps.
   - **75Ω** – Set the B/UB section to ON.
   - **120Ω** – Set the B/UB section to OFF.
   - **100Ω** – Set ASM-40 to 192, 384, 768, 1536 and 1544 kbps. In this case, the B/UB section of the SW3 switch is disabled.
6. Close the bottom panel lid.

   Now you can proceed with the line, DTE and power connections as described below.

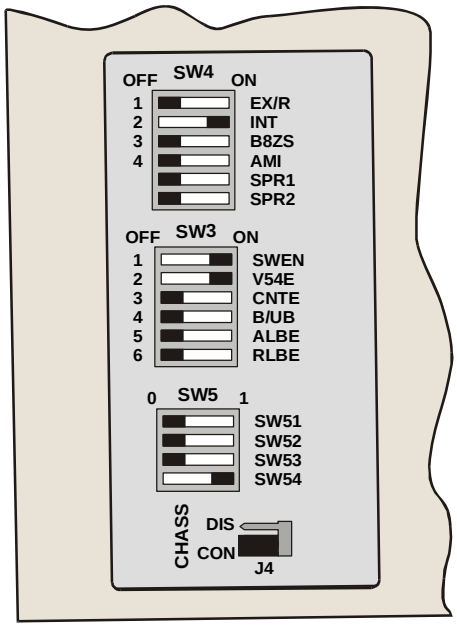

Figure 2-1. ASM-40 Jumper and DIP Switches

Table 2-1. ASM-40 Internal Jumpers and Switches

DIP Switch	Function	Possible Settings	Factory Setting
EX/R and INT sections, SW4/1, 2	Select the transmit clock	**INT** – ON, internal clock. EX/R section is disabled **EX/R** – ON, **INT** – OFF, receive clock **EX/R** – OFF, **INT** – OFF, external clock	INT – ON EX/R – OFF
***Note**: When set to external clock, ASM-40 automatically configures itself to the DTE data rate, disabling SW3 (baud rate).*			
B8ZS and AMI sections, SW4/3, 4	Select the line code	**B8ZS** – OFF, **AMI** – ON, AMI line code **B8ZS** – OFF, **AMI** – OFF, HDB3 or B8ZS line code, depending on the selected data rate	B8ZS – OFF AMI – OFF
***Note**: When setting data rate to 32, 64, 128, 256, 512, 1024, 1920 or 2048 kbps, the HDB3 line coding is automatically selected. In this case the B8ZS and AMI section settings are irrelevant. The B8ZS and AMI sections are in use only if the data rate is set to 192(B8ZS only), 384, 768, 1536 or 1544 kbps.*			
SWEN section, SW3/1	Enables activation of the loopbacks and internal BERT via the front panel pushbuttons	**ON** – The diagnostic tests can be activated via the front panel **OFF** – The diagnostic tests cannot be activated via the front panel	ON
V54E section, SW3/2	Controls activation of the local digital loopback when remote digital loopback is initiated from the remote unit	**ON** – Local digital loopback activation is enabled **OFF –** Local digital loopback activation is disabled	ON
CNTE section, SW3/3	Selects the transmit carrier mode	**ON –** Carrier follows the RTS line **OFF –** Carrier is constantly ON	OFF
Note: For ASM-40 units with G.703 Codirectional DTE interface, the CNTE section (SW3/3) must be set to OFF.			
B/UB section, SW3/4	Selects the line impedance: • Balanced: terminal block or DB-15 • Unbalanced: BNC	**ON –** 75Ω (for 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps) **OFF** – 120Ω (for 32, 64, 128, 256, 512, 1024, 1920 and 2048 kbps)	According to the connector type
***Note**: 100Ω line impedance is set by selecting one of the following data rates: 192, 384, 768, 1536 and 1544 kbps. In this case, the settings of the SW3 B/UB section are ignored.*			
ALBE section, SW3/5	Enables local analog loopback activation from the DTE (via pin 18 for V.24, RS-530, V.36 or via pin "JJ" for V.35)	**ON** – The local analog loopback activation from the DTE is enabled **OFF** – The local analog loopback activation from the DTE is disabled	OFF
***Note**: Set this section to DIS if the DTE interface does not support the local analog loopback activation via the appropriate pin.*			

Table 2-1. ASM-40 Internal Jumpers and Switches (Cont.)

DIP Switch	Function	Possible Settings	Factory Setting
RLBE section, SW3/6	Enables remote digital loopback activation from the DTE (via pin 21 for V.24, RS-530, V.36 or via pin "HH" for V.35)	**ON** – The remote digital loopback activation from the DTE is enabled **OFF** – The remote digital loopback activation from the DTE is disabled	OFF
Note: *Set this section to DIS if the DTE interface does not support the remote digital loopback activation via the appropriate pin.*			
SW5	Selects data rate	SW54 SW53 SW52 SW51 0 0 0 0 2048 0 0 0 1 1920 0 0 1 0 1544 0 0 1 1 1536 0 1 0 0 1024 0 1 0 1 768 0 1 1 0 512 0 1 1 1 384 1 0 0 0 256 1 0 0 1 192 1 0 1 0 128 1 0 1 1 64 1 1 0 0 32 ***Note***: *For the G.703 and V.24 interfaces, the default setting is 64.*	256 (64)
J4, CHASS	Controls the connection between the ASM-40 signal ground and the frame (chassis) ground	**CON** – Signal ground is connected to the frame ground **DIS** – Signal ground is disconnected from the frame ground	CON
Note: *Disconnecting the signal ground from the frame ground may render the unit unsafe for connection to unprotected telecommunication networks in some locations.*			

Connecting the Interfaces

Figure 2-2 illustrates the AC-powered ASM-40 rear panel.

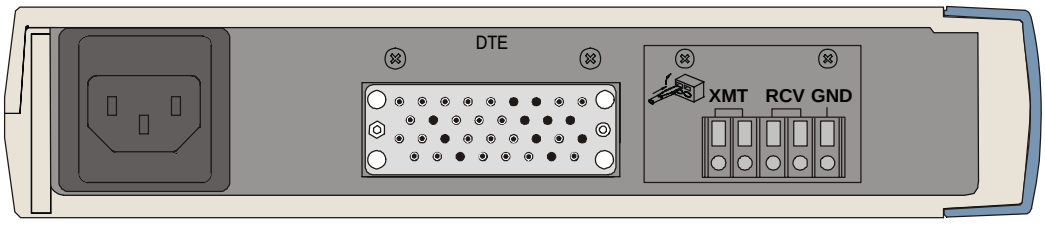

Figure 2-2. ASM-40 with V.35 Interface and Terminal Block Line Connector (AC Version)

Connecting the Line

The ASM-40 line connector may be optionally DB-15 female or a 5-port terminal block or two BNC coax connections. Refer to the appropriate section below for the description of the connection procedures for the relevant line interface types.

➤ **To connect the DB-15 balanced interface:**

Use DB-15 male cable connector and connect it to the ASM-40 line port designated LINE.

Refer to *Appendix A* for the DB-15 connector pin assignment.

➤ **To connect the terminal block:**

1. Connect the transmit pair to the terminals marked XMT.
2. Connect the receive pair to the terminals marked RCV.
3. Connect the ground wire to the terminal marked GND (optional).

Notes

- *The transmit and receive pairs are polarity insensitive.*
- *The GND terminal is connected to the AC power ground wire.*

➤ **To connect the BNC connectors:**

1. Connect the transmit cable to the BNC connector marked XMT.
2. Connect the receive cable to the BNC connector marked RCV.

Connecting the DTE

The rear-panel DTE connector provides interface for data input/output, clock reference and control signal exchange between ASM-40 and the DTE. The DTE interface may terminate in the following connectors:

Table 2-2. DTE Interface Connectors

Interface	Connector
V.24/RS-232	25-pin D-type female
RS-530	25-pin D-type female
V.36/RS-449	via adapter cable converting between RS-530 connector and 37-pin, D-type, female
V.35	34-pin female
X.21	15-pin D-type female
G.703-HDB3	DB-15 female or BNC
G.703 Codirectional	5-clip terminal block or RJ-45
IR-ETH	RJ-45 or BNC
IR-IP	RJ-45
IR-ETH/QN	RJ-45

Connector pin allocations for the IR-ETH, IR-IP, and IR-ETH/QN interface modules appear in *Appendix B*, *Appendix C*, *Appendix D* and *Appendix E* respectively; pin assignments for the rest of the DTE interface options are described in *Appendix A*.

The pin assignment of the G.703-HDB3 DB-15 connector is the same as of the line side DB-15 connector (see *Appendix A*).

➤ **To connect the DTE:**

Connect the DTE to the appropriate ASM-40 rear panel connector.

Note *When using ASM-40 unit with X.21 interface in the external clock mode, connect the input clock to pin 7(EXTC(A)) and pin 14(EXTC(B)) of the 15-pin DTE connector.*

RAD recommends using a shielded twisted pair cable between ASM-40 and the DTE. The receivers on the ASM-40 are 100Ω terminated (for X.21 and RS-530). If problems are encountered with the connection to the DTE interface, make sure that the DTE interface is terminated correctly.

Connecting the Power

To connect ASM-40 to the power source, refer to the appropriate section below, depending on your version of the unit (AC or DC).

Warning

Before switching on this unit and connecting any other cable, the protective earth terminals of this unit must be connected to the protective ground conductor of the mains power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

AC Power Connection

AC power should be supplied to ASM-40 through the 1.5m (5 ft) standard power cable terminated by a standard 3-prong plug. The cable is provided with the unit.

➤ **To connect AC power:**

1. Connect the power cable to the power connector on the ASM-40 rear panel.
2. Connect the power cable to the mains outlet.

   The unit turns on automatically upon connection to the mains.

DC Power Connection

➤ **To connect DC power:**

Refer to *DC Power Supply Connection Supplement*.

Chapter 3

Operation

This chapter provides the following information for the ASM-40 standalone modem:

- ASM-40 front-panel indicators and controls
- Operating procedures (turn-on, front-panel indications, performance monitoring and turn-off).

Installation procedures given in *Chapter 2* must be completed and checked before attempting to operate ASM-40.

3.1 Front Panel Controls and Indicators

Figure 3-1 shows the ASM-40 front panel. *Table 3-1* lists the ASM-40 controls, indicators and their functions.

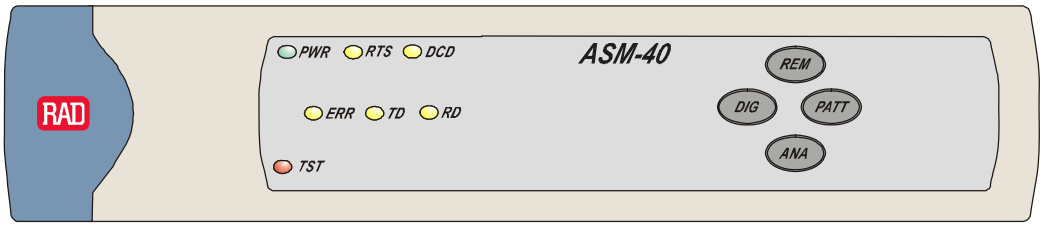

Figure 3-1. ASM-40 Front Panel

Table 3-1. ASM-40 Front Panel Controls and Indicators

Name	Type	Function
PWR	Green LED	ON – Power is on.
RTS	Yellow LED	ON – The DTE activates Request To Send.
TD	Yellow LED	ON – Steady SPACE is being transmitted. Blinks – Data is being transmitted.
RD	Yellow LED	ON – Steady SPACE is being received. Blinks – Data is being received.
DCD	Yellow LED	ON – A valid receive signal is present.
TEST	Red LED	ON – ASM-40 is in any of the three loopback modes, or when PATT is pressed.
ERR	Yellow LED	ON or blinks if errors are present in the test pattern. Lights up momentarily when PATT pushbutton is pressed.

Table 3-1. ASM-40 Front Panel Controls and Indicators (Cont.)

Name	Type	Function
DIG	Pushbutton	The digital loopback pushbutton causes the local ASM-40 to loop received data to its transmitter. Data Set Ready changes to OFF (see *Figure 4-3*).
ANA	Pushbutton	The local loopback (V.54 loop 3) pushbutton causes the local ASM-40 to loop its transmitter output back to its receiver (see *Figure 4-1*). The transmitter continues to send data to the line. This loopback may also be activated from the DTE when the ALBE section of the SW3 switch is set to ON.
REM	Pushbutton	The remote digital loopback (V.54 Loop 2) pushbutton causes the remote ASM-40 to loop received data to its transmitter (see *Figure 4-2*). Data Set Ready changes to OFF. This loopback may also be activated from the DTE when the RLBE section of the SW3 switch is set to ON.
PATT	Pushbutton	The PATT switch causes ASM-40 to send and receive a 511 test pattern. If errors are encountered, the ERR indicator lights up. Receive Data and Clear To Send changes to OFF. The RD LED turns off.

3.2 Operating Procedure

Turning ASM-40 On

ASM-40 is turned on as soon as power is connected. When power is connected, the PWR indicator lights up and remains lit as long as ASM-40 receives power.

ASM-40 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when:

- ASM-40 must be adapted to new operational requirements
- Diagnostic loopbacks are performed.

Normal Indications

If the local and remote ASM-40 units are in operation and transmitting/receiving data, the following indicator conditions exist:

- PWR: On
- RTS: On
- TD: Flashing when transmitting
- RD: Flashing when receiving
- DCD: On
- TEST: Off.

If the above LED indications are not obtained following initial power turn-on, check that none of the test pushbuttons is pressed. If none of the pushbuttons is pressed, refer to *Chapter 4* for the diagnostic test instructions.

Turning ASM-40 Off

To turn off ASM-40, remove the power cord from the power source.

Chapter 4

Troubleshooting and Diagnostics

This chapter contains procedures for performing system diagnostic tests for ASM-40. Use the test procedures provided in this chapter to:

- Verify normal system operation
- Isolate faulty equipment
- Identify other sources of system malfunction.

Tests are activated by the pushbuttons on the ASM-40 front panel and monitored via LED indicators. For description of ASM-40 controls and indicators and their functionality, see *Chapter 3*.

4.1 V.54 Loopback Tests

ASM-40 supports several types of loopbacks for evaluating the operation of the data system equipment and line circuits. Using these loopbacks, you can test communication between the attached equipment, internal circuitry of the local ASM-40 and remote ASM-40.

Loopback tests are best performed in the following order:

1. Local analog loopback
2. Remote digital loopback
3. Local digital loopback.

Before testing the operation of the data system equipment and line circuits, ensure that all units are powered up and configured normally.

Note *If you want to perform the LLB and RLB tests via the DTE interface pins, ensure that the ALBE and RLBE sections of the SW3 DIP switch are set to ON (see Figure 2-1 and Table 2-1). The loopback activation via the DTE pins is not available for the X.21, Ethernet and G.703 interfaces.*

Local Analog Loopback (LLB)

The local analog loopback (LLB) test checks the performance of the local ASM-40 modem, the local data terminal, and the connections between them (see *Figure 4-1*). The test is performed separately at the local and the remote site.

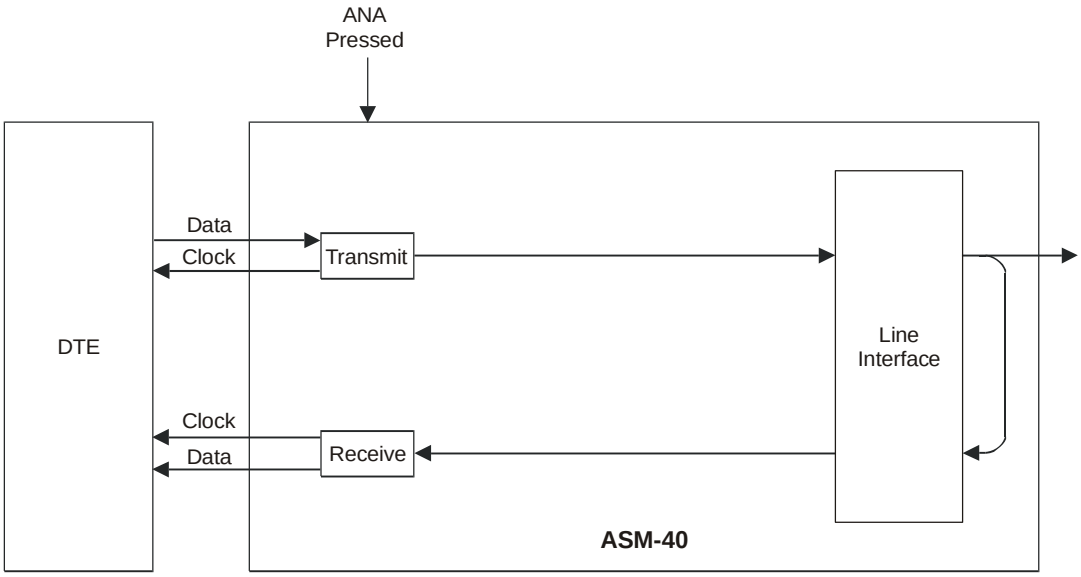

Figure 4-1. Local Analog Loopback

➤ **To perform the local analog loopback test:**

1. Press the ANA pushbutton.

   The TEST LED on the ASM-40 front panel lights up. The ASM-40 transmit output is now connected to its own receiver.

2. Execute the local analog loopback with one of the following methods:

   - Using the DTE and checking the echoed data stream.
   - Using an external BER tester.

   If the BER test indicates an error-free data stream, but the DTE test indicates a fault, verify that the cable between the DTE and ASM-40 is properly connected. If the problem persists, follow the DTE manufacturer's test procedures.

To isolate a communication line problem, perform the LLB loopback at the opposite end. If both LLB tests are error-free, the fault is probably in the communication line or in the line interfaces.

After completing the test or correcting the fault, press ANA pushbutton again to restore it to the Off position.

Remote Digital Loopback (RLB)

The remote digital loopback (RLB) test checks the performance of the local and the remote ASM-40 units and their connecting lines. The remote digital loopback sets a loop at the remote ASM-40 unit from the DTE coupled to the local unit (see *Figure 4-2*).

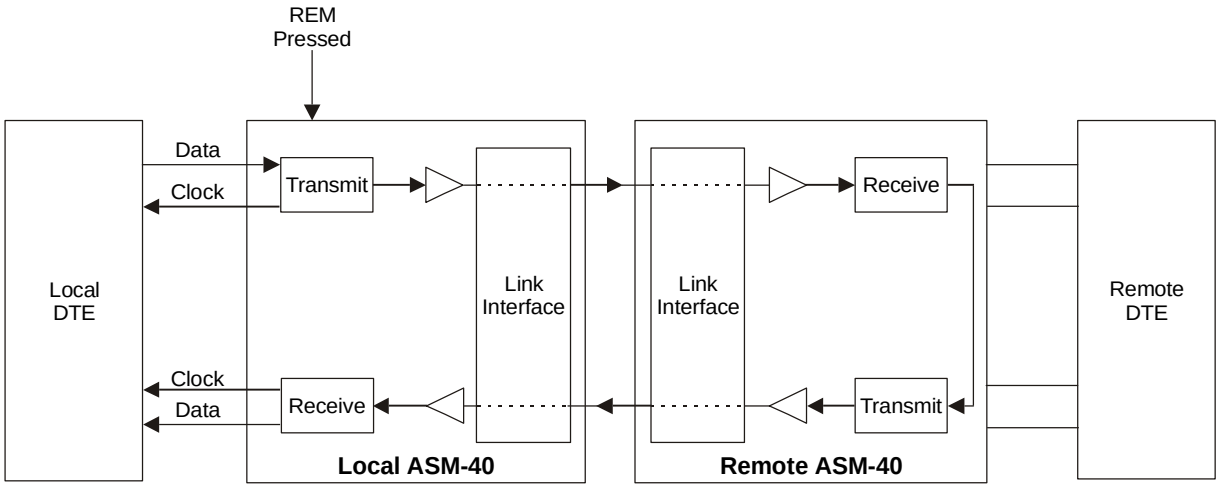

Figure 4-2. Remote Digital Loopback

➤ **To activate the remote digital loopback:**

1. Press the REM pushbutton on the local ASM-40 front panel.

   The following LEDs are ON:

   - Local unit: TEST, DCD, RTS, TD and RD
   - Remote unit: TD, RTS, and TEST.

2. Perform the BERT test as explained above for the local analog loopback test.

   If an error occurs, while the local analog loopback test described above, was successful for both the local and remote modems, the line or the line circuits of the local or the remote unit are not operating properly.

3. After completing the test or correcting the fault, press REM pushbutton again to restore it to the Off position.

Local Digital Loopback (DIG)

The local digital loopback (DIG) test allows the operator at the remote end to check the performance of the local and remote ASM-40 units, and their connecting lines. The DIG test loops the received data back to the remote ASM-40 (see *Figure 4-3*). The local digital loopback test is equivalent to activating the remote loopback from the remote ASM-40.

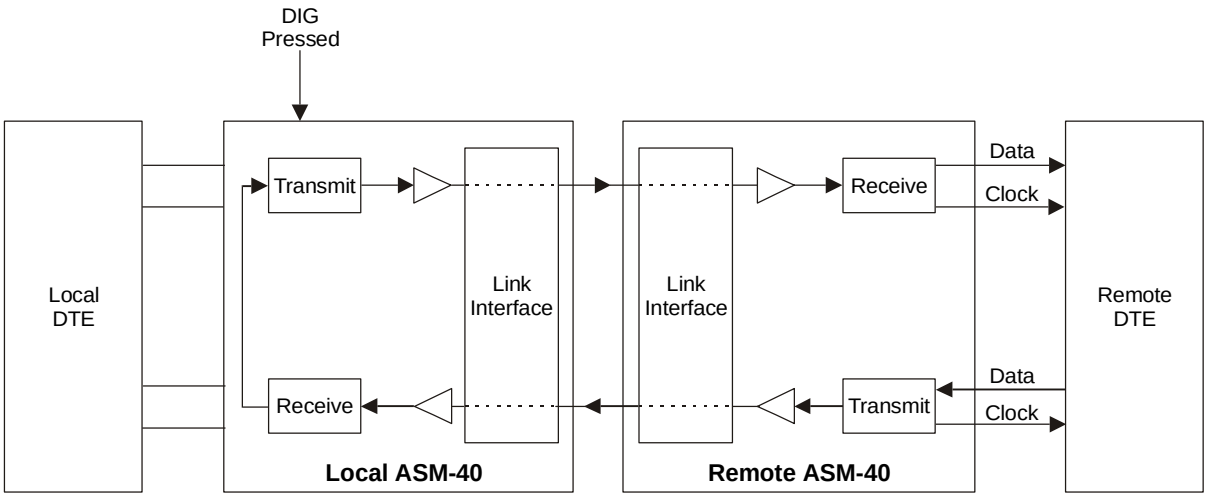

Figure 4-3. Local Digital Loopback

➤ **To activate the local digital loopback:**

- Press the DIG pushbutton on the local ASM-40 front panel.

  The following LEDs are ON:

  - Local unit: TEST, RTS, and TD
  - Remote unit: DCD, RTS, TD and RD.

Note

You can activate the local digital loopback by running remote digital loopback at the remote unit. If the V54E section of the SW3 DIP switch is set to ON, the local ASM-40 closes the DIG loopback when it detects the RLB activation at the remote end.

4.2 Internal BERT

ASM-40 has a built-in BERT circuit consisting of a pattern generator and a pattern tester. This circuit works in conjunction with the V.54 diagnostic loops and the remote BERT to verify normal system operation and identify faulty equipment in the event of the system failure.

The pattern transmitted by the BER system can be looped back for comparison (modem self-test) or can be received by another ASM-40 (Two-BER test).

When used opposite another ASM-40, the complete link can be tested either when the PATT button is pressed, or with external BERT transmitting the same 511-bit pattern.

Modem Self-Test

The test verifies that the modem is operating correctly (see *Figure 4-4*).

➤ **To activate the modem self-test:**

1. Press the ANA pushbutton on the front panel. The TEST and DCD LEDs light up.

2. Press the PATT pushbutton. Verify that:
   - TEST LED is lit
   - ERR LED lights up momentarily.

If errors are encountered, the ERR led lights (for continuous errors) or blinks (for intermittent errors), the ASM-40 unit is faulty and should be replaced. If the test executes correctly, restore all pushbuttons and switches to their normal positions.

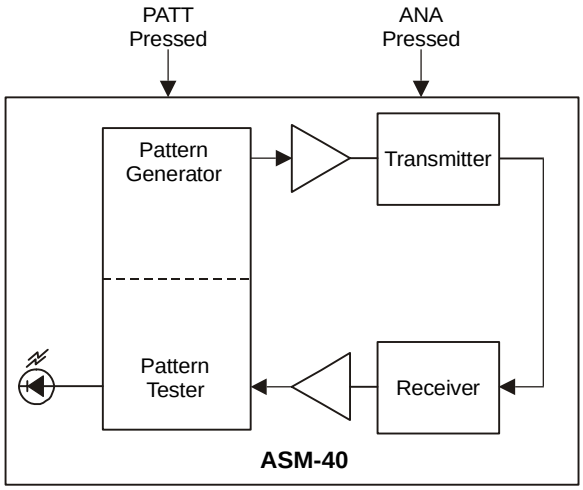

Figure 4-4. Modem Self-Test

Two-BERT Test

The Two-BERT test checks the link between the two DTEs (*Figure 4-5*).

➤ **To perform the Two-BERT test:**

Press the PATT pushbutton on the front panel of the local and remote ASM-40 units.

If errors are encountered, the ERR led lights (for continuous errors) or blinks (for intermittent errors), the ASM-40 unit is faulty and should be replaced.

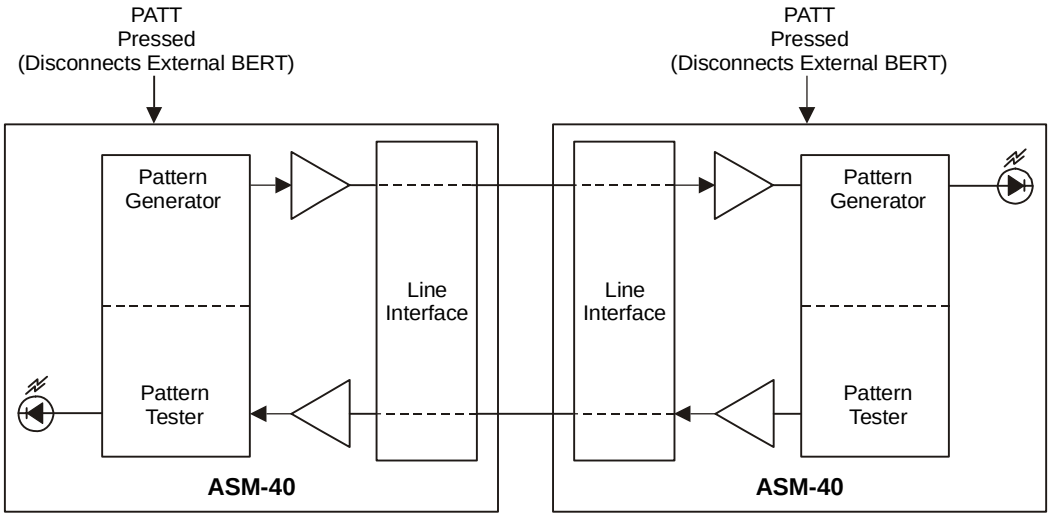

Figure 4-5. ASM-40 BER System Test (Two-BER Test)

Chapter 5

ASM-40/R Card

This chapter describes the ASM-40/R card version, designed for installation in the ASM-MN-214 card cage. The chapter contains the following sections:

- The ASM-MN-214 card cage
- The ASM-40/R card version
- Power supply to ASM-40/R card
- Installing the ASM-40/R card.

5.1 ASM-MN-214 Card Cage

The ASM-MN-214 card cage contains one or two power supplies and up to 14 plug-in cards. The card types can be ASM-40/R or other RAD rack version modems/converters – any combination of up to 14 plug-in cards.

For each of the 14 cards, the rear panel (see *Figure 5-1*) contains a male connector for the terminal block and a DB-25 connector. A protection cover protects the terminal block connectors.

Line Connector

The terminal block (see *Figure 5-1*) is to be attached to the rear panel terminal block connectors. It contains screws for connecting the transmit and receive pairs and ground, if present. When operating ASM-40/R with unbalanced E1 interface, use a CIA/TB-BNC/214 adapter, which converts the terminal block connector into two coaxial BNC connectors (see *Figure 5-1*).

The ASM-MN-214 card cage is also available with BNC coaxial unbalanced line connectors.

DB-25 DTE Connector

The 25-pin D-type female interface connector provides all interface signals for the digital interfaces. Modems with X.21 or V.35 interface require an external mechanical adapter. Two optional interface attachments, CIA/X21/1 and CIA/V.35/1, can be ordered separately from RAD. CIA/X.21/1 converts one DB-25 connector to an X.21 15-pin connector. CIA/V.35/1 converts one DB-25 connector to a V.35 34-pin connector.

V.36 modem cards are supplied with a RAD adapter cable CBL 530/449F, which converts between the DB-25 connector and a V.36 37-pin connector.

ASM-40/R with one of the Ethernet interfaces (IR-ETH or IR-ETH/QN) uses a CIA/ETH interface adapter, which converts one DB-25 connector to an RJ-45 connector.

The adapter cable and interface attachments are also shown in *Figure 5-1*.

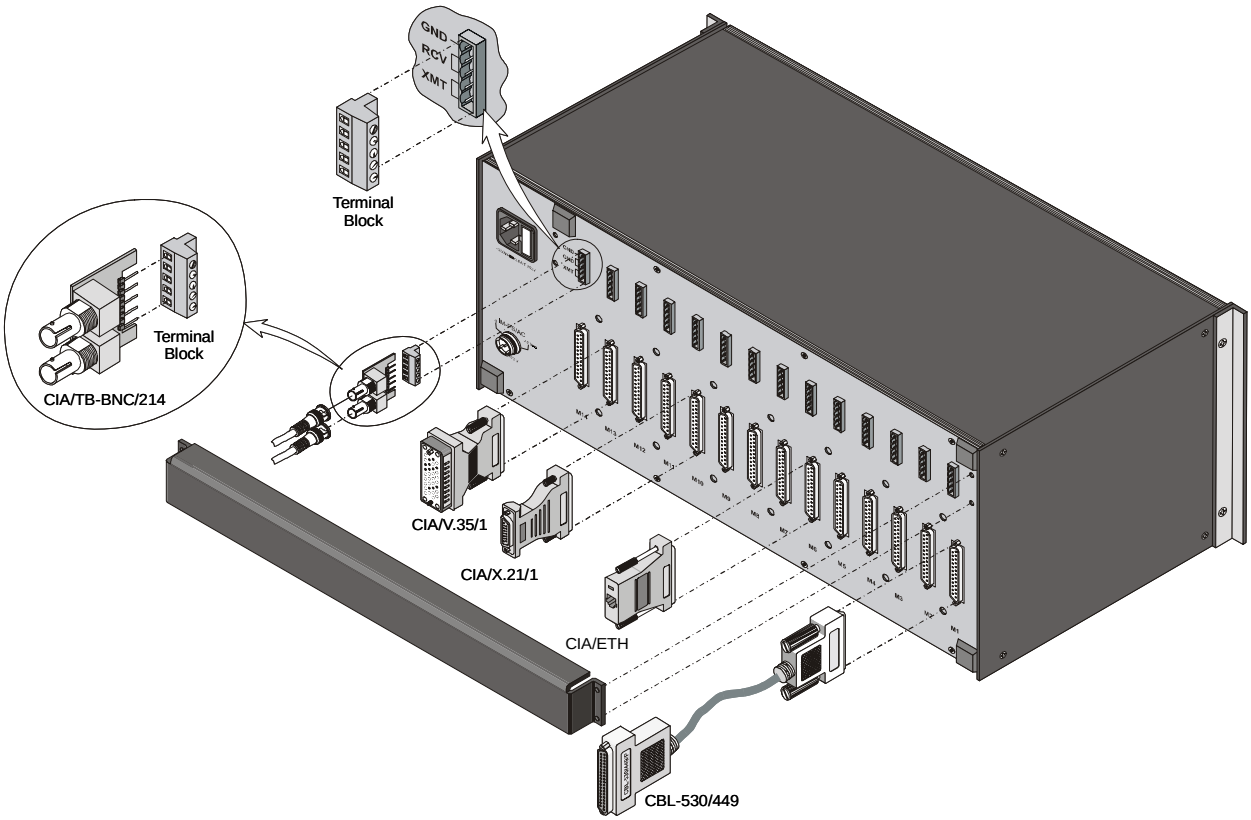

Figure 5-1. ASM-MN-214 Rear Panel

5.2 Power Supply

Power is supplied to the ASM-40/R card from the ASM-MN-214 power supply via the chassis. Each ASM-40/R card has two fuses (F1 and F2), which protect the entire system against power failure resulting from a short circuit in one card. The rating of the fuses is 1A, 250V, slowblow (see *Figure 5-4*).

The ASM-MN-214 card cage can accept both AC or DC power supplies. LED indicators located on the ASM-MN-214 front panel (see *Figure 5-3*) show activity when the power supply is connected to the mains plug. The power supply supports the full card cage with any combination of cards.

AC Supply

The AC power supply of the ASM-MN-214 is 100, 115, or 230 VAC, ±10%, 47 to 63 Hz.

DC Supply

The DC power supply is -48 VDC (-36 to -72 VDC) or 24 VDC (18 to 32 VDC). It uses a DC/DC converter module to provide the power required for the cards.

Power Supply with Redundancy

This special ordering option is equipped with two separate power supplies, operating together and sharing the load of the whole card cage. If either of the power supplies fails, the other one will continue to supply power to the full card cage.

Two LED indicators show activity of each power supply. They should both light when mains power is provided.

Note

It is possible to combine AC and DC power supplies in the same cage.

5.3 ASM-40/R Front Panel

Figure 5-2 shows the ASM-40/R card front panel. The LEDs and pushbuttons of the card version are identical in their functionality to those of the standalone device. For this information, refer to *Front Panel Controls and Indicators* in *Chapter 3.*

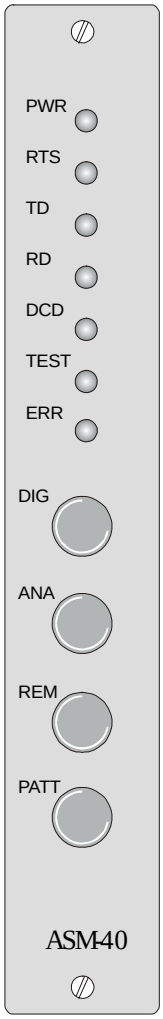

Figure 5-2. ASM-40/R Front Panel

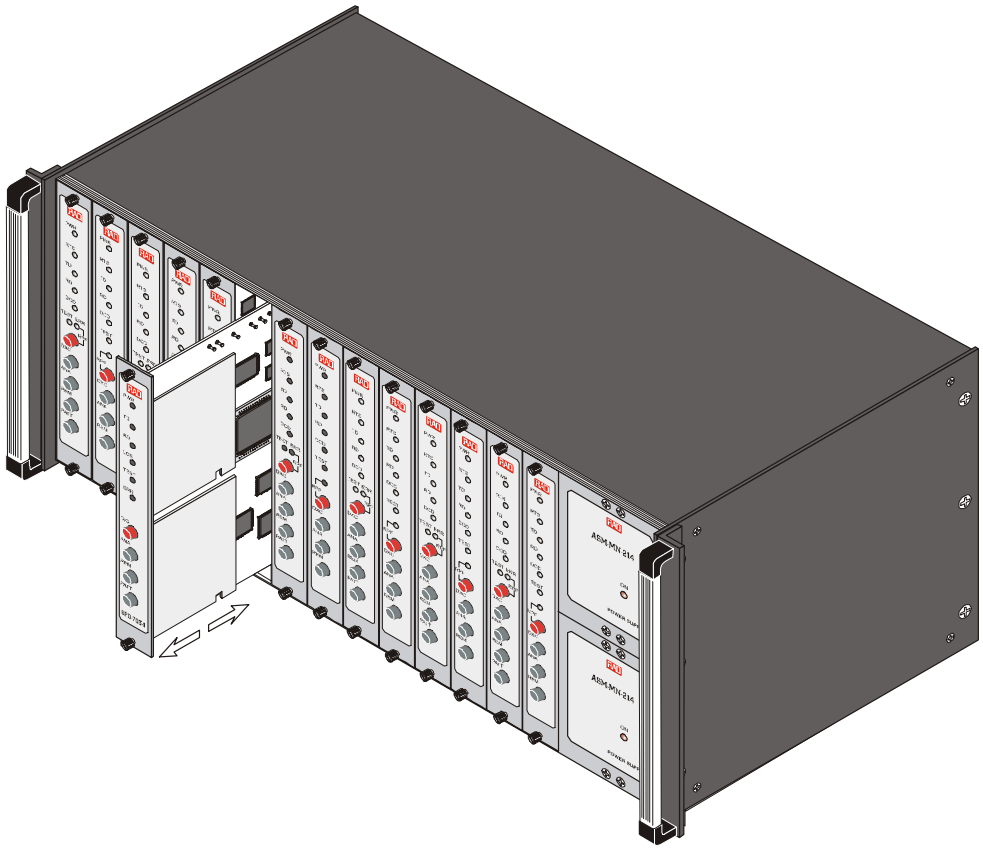

Figure 5-3. ASM-MN-214 Front Panel

5.4 Installing the ASM-40/R Card

Setting Internal Jumpers and Switches

The ASM-40/R internal DIP switches are similar in their functionality to those of the standalone unit. The configuration DIP switches are located on the print side of the modem card. The J5 jumper is located on the component side of the card; it is identical to the J4 jumper of the standalone ASM-40.
For the details on the configuration DIP switch settings, refer to *Figure 2-1* and *Table 2-1*. *Figure 5-4* illustrates the ASM-40/R PCB layout.

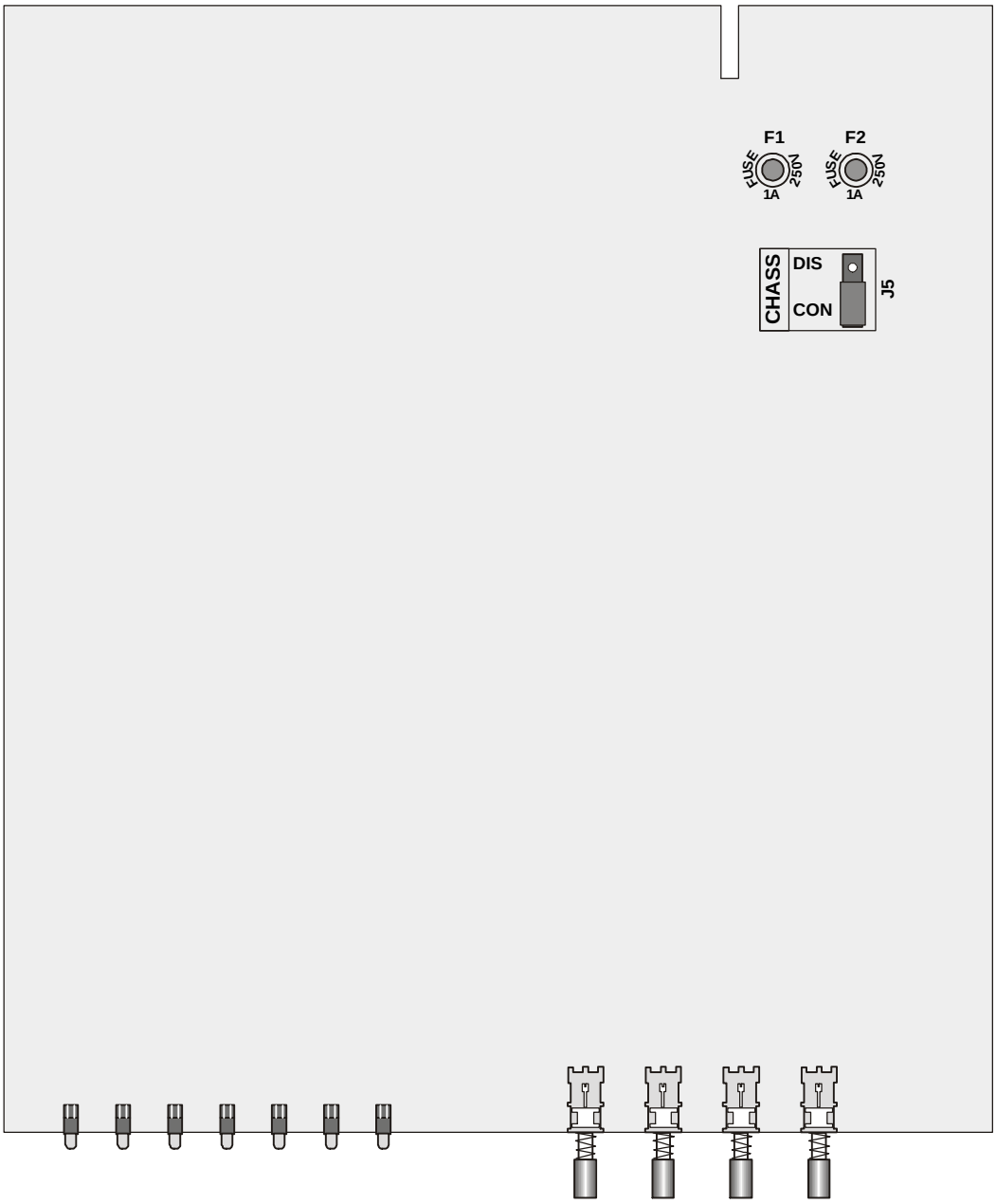

Figure 5-4 ASM-40/R PCB Layout, Component Side

Installing ASM-40/R into the ASM-MN-214 Card Cage

➤ To install the ASM-40/R card in the ASM-MN-214 card cage:

1. Install the ASM-MN-214 card cage in the 19-inch rack.
2. Insert the ASM-40/R card into one of the ASM-MN-214 slots.
3. Push the card into the cage until it is fully inserted into the edge connector inside the rack.
4. Tighten the screws on front panel of the modem card.

Connecting the Interfaces

ASM-40/R uses the ASM-MN-214 rear panel terminal block ports for the line connections. The 25-pin D-type female connector serves as a DTE port.

1. Remove the protection cover from the terminal block connectors.
2. Connect the terminal block to the ASM-MN-214 terminal block connector.
3. Connect the line to the terminal block as follows: connect transmit pair to the terminals marked XMT, the receive pair to the terminals marked RCV, and the fifth screw to ground (optional).
4. When operating ASM-40/R with unbalanced interface, use CIA/TB-BNC/214 adapter, which converts the terminal block connector into two coaxial BNC connectors.
5. If required, attach the appropriate CIA (CIA/X.21/1, CIA/V.35/1, CIA/ETH) or V.36 adapter cable to the DB-25 connector on the card cage rear panel.
6. Connect the DTE cable to the DB-25 connector, other side of CIA or adapter cable (depending on your version of the card interface).
7. Connect power to the ASM-MN-214 card cage:
   - To connect AC power, connect the power cable to the mains supply.
   - To connect DC power, refer to *DC Power Supply Connection Supplement* of the ASM-MN-214 Installation and Operation Manual.

Warning

The ASM-MN-214 card cage has no power switch. Operation starts when the power is applied to the rear panel POWER connector. When applying power, first connect the plug of the power cord to the ASM-MN-214 POWER connector and then to the mains power source (outlet).

Appendix A

Pinouts

A.1 V.24, V.35, X.21 and RS-530 DTE Interface Connectors

Table A-1 lists the pin assignments of the V.24/RS-232, V.35, X.21 and RS-530 interface connectors.

Table A-1. DTE Interface Signal Assignments

Signal Function	RS-232	V.35		RS-530	X.21		Description
	DB-25 Standalone and Card Cage	DB-25 Card Cage	34-Pin Standalone Pin Circuit	DB-25 Standalone and Card Cage Pin Circuit	DB-25 Card Cage	DB-15 Standalone Pin Circuit (Function)	
Protective Ground	1	1	A Frame 101	1	1	1 (Shield)	Chassis Ground. It may be isolated from Signal Ground.
Signal Ground	7	7	B Signal 102	7	7	8 (GND)	Common signal and DC power supply ground.
Transmitted Data	2	9 11	P TD(A) 103 S TD(B) 103	2 14	2 14	2 9 (Transmit)	Serial digital data from DTE. In sync applications, the data translations must occur on the rising edge of the transmit clock.
Received Data	3	12 13	R RD(A) 104 T RD(B) 104	3 16	3 16	4 11 (Receive)	Serial output from the modem receiver. In sync applications, the data translations occur on the rising edge of the clock.

Signal Function	RS-232	V.35		RS-530	X.21		Description
	DB-25 Standalone and Card Cage	DB-25 Card Cage	34-Pin Standalone Pin Circuit	DB-25 Standalone and Card Cage Pin Circuit	DB-25 Card Cage	DB-15 Standalone Pin Circuit (Function)	
Request to Send	4	4	C RTS 105	4 19	4 19	3 10 (Control)	A positive level to ASM-40 when data transmission is desired.
Clear to Send	5	5	D CTS 106	5 13			A positive level from ASM-40 with delay, after receipt of Request to Send, and when ASM-40 is ready to transmit.
Data Set Ready	6	6	E DSR 107	6 22			A positive level from ASM-40 when power is on, and ASM-40 is (a) not in DIGITAL LOOP mode, or (b) has not received a REMOTE LOOPBACK signal from the remote unit.
Data Terminal Ready	20	20	H DTR 108	20 23			Not used
Carrier Detect	8	8	F DCD 109	8 10	8 10	5 12 (Indication)	A positive level from ASM-40, except when a loss of the received signal is detected or when Data Set Ready is negative.
External Transmit Clock	24	19 16	U SCTE(A) 113 W SCTE(B) 113	24 11	24 11	7 14	A serial data rate clock input from the data source. Positive clock translations must correspond to data transmissions.

Signal Function	RS-232	V.35		RS-530	X.21		Description
	DB-25 Standalone and Card Cage	DB-25 Card Cage	34-Pin Standalone Pin Circuit	DB-25 Standalone and Card Cage Pin Circuit	DB-25 Card Cage	DB-15 Standalone Pin Circuit (Function)	
Transmit Clock	15	14 10	Y SCT(A) 114 a SCT(B) 114	15 12	15 12	6 S(A) 13 S(B) (Signal Timing)	A transmit data rate clock for use by an external data source. Positive clock translations correspond to data translations.
Receive Clock	17	23 22	V SCR(A) 115 X SCR(B) 115	17 9			A receive data rate clock output used by an external data sink. Positive clock translations correspond to data translations.
Local Analog Loop	18	18	L and j	18			A control signal input, which, when on, sets ASM-40 into Local Analog Loopback (V.54 Loop 3).
Remote Digital Loop	21	21	N and h	21			A control signal input which, when on, commands ASM-40 to send a remote Loopback command (V.54 Loop 2) to the remote ASM-40.
Test Indicator	25	25	n and k	25			A Control Signal output from ASM-40; positive during any test mode.

A.2 V.36 Interface Connector

The ASM-40 V.36 interface is provided via an adapter cable converting between 25-pin RS-530 connector and 37-pin V.36 connector. *Table A-2* lists the cable wiring.

Table A-2. Cable Converting between RS-530 and V.36 Interfaces, Pin Assignment

Signal Function	V.36		RS-530	
	Pin	Circuit	Pin	Circuit
Protective Ground	1	Shield	1	
Signal Ground	19	SG	7	AB
DTE Common Return	37	SC		
DCE Common Return	20	RC		
Transmitted Data	4 22	SD (A) SD (B)	2 14	BA (A) BA (B)
Received Data	6 24	RD (A) RD (B)	3 16	BB (A) BB (B)
Request to Send	7 25	RS (A) RS (B)	4 19	CA (A) CA (B)
Clear to Send	9 27	CS (A) CS (B)	5 13	CB (A) CB (B)
Data Set Ready	11 29	DM (A) DM (B)	6 22	CC (A) CC (B)
Data Terminal Ready	12 30	TR (A) TR (B)	20 23	CD (A) CD (B)
Carrier Detect	13 31	RR (A) RR (B)	8 10	CF (A) CF (B)
External Transmit Clock	17 35	TT (A) TT (B)	24 11	DA (A) DA (B)
Transmit Clock	5 23	ST (A) ST (B)	15 12	DB (A) DB (B)
Receive Clock	8 26	RT (A) RT (B)	17 9	DD (A) DD (B)
Local Analog Loopback	10	LL	18	LL
Remote Loopback	14	RL	21	RL
Test Indicator	18	TM	25	TM

A.3 ASM-40/R with Ethernet Interface, DTE Connection

ASM-40/R with the IR-ETH or IR-ETH/QN Ethernet interface module uses a CIA/ETH interface adapter, which converts one DB-25 connector to an RJ-45 connector. If you intend to prepare a DB-25/RJ-45 adapter cable yourself, refer to *Figure A-1* and *Table A-3* for the pin designations and their assignment.

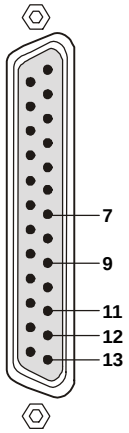

Figure A-1. Pinout of the DB-25 Connector of ASM-MN-214 (Ethernet Interface)

Table A-3. DB-25 and RJ-45 Pinout, Ethernet

Signal	Pin	
	DB-25	RJ-45
RCV (+)	13	3
RCV (-)	12	6
XMT (+)	11	1
XMT (-)	9	2
GND	7	–

A.4 ASM-40/R with G.703-HDB3 Interface

ASM-40/R with G.703-HDB3 DTE interface uses the terminal block (line) and DB-25 (DTE) connectors located on the rear panel of the ASM-MN-214 card cage. *Figure A-2* illustrates the terminal block line connector, and *Table A-4* lists the DB-25 connector pinout.
When using an unbalanced option, pins marked with an asterisk (*) may be connected to the signal ground on the PCB.

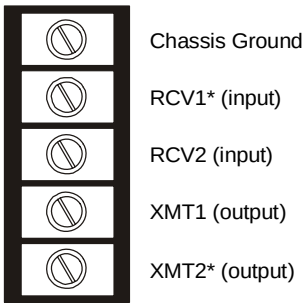

Figure A-2. Terminal Block Line Connector

Table A-4. DB-25 Connector Pinout (G.703-HDB3 Interface)

Pin	Function
2	RX (data input)
22*	RX (data input)
9	TX (data output)
11*	TX (data output)

Note *On the DTE side (HDB3 board), the jumper marked J2 is for the receive side (input), and the jumper marked J3 is for the transmit side (output).*

A.5 ASM-40/R with G.703 Codirectional Interface

ASM-40/R with G.703 Codirectional interface uses an adapter cable that converts one DB-25 connector to an RJ-45 connector. Refer to *Figure A-3* and *Table A-5* for the pin designations and their assignment.

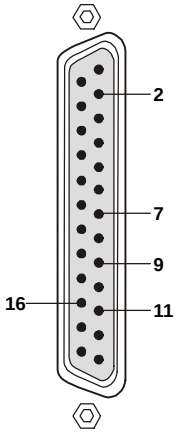

Figure A-3. Pinout of the DB-25 Connector of ASM-MN-214 (G.703 Codirectional)

Table A-5. DB-25 and RJ-45 Pinout, G.703 Codirectional

Signal	Pin	
	RJ-45	DB-25
RCV (+)	3	9
RCV (-)	6	11
XMT (+)	4	2
XMT (-)	5	16
GND	2	7

A.6 DB-15 Line Connector (Standalone ASM-40)

Line interface of the standalone ASM-40 unit may terminate in DB-15 female connector, wired in accordance with *Table A-6*.

Table A-6. DB-15 Line Connector Pin Assignment

Pin	Function
11	Receive (data in)
3	Receive (data in)
9	Transmit (data out)
1	Transmit (data out)

Appendix B

IR-ETH Interface Module

IR-ETH is an interface module for RAD modems, used for converting the Ethernet (10BaseT or 10Base2) electrical levels to the modem TTL levels. It also converts the Ethernet protocol to HDLC to enable long-distance transmission and avoid the Ethernet collision limitation.

IR-ETH includes an internal, self-learning Ethernet bridge, which enables a high performance link between two Ethernet segments at a low transmission rate. The low-speed HDLC transmission is sent over the link using the modem modulation technique. It is converted back to an Ethernet signal at the remote modem.

Figure B-1 shows a typical application using an Ethernet interface bridge. Each modem is connected to an Ethernet network via the Ethernet interface bridge.

Figure B-1. Typical Application of ASM-40 with IR-ETH Module

B.1 IR-ETH Connector Options

Figure B-2 and *Figure B-3* show the rear panel of ASM-40 with the IR-ETH connector options. *Table B-1* lists the RJ-45 connector pinout.

Appendix A describes the pinout of the DB-25 connector serving the LAN connection of the ASM-40/R card.

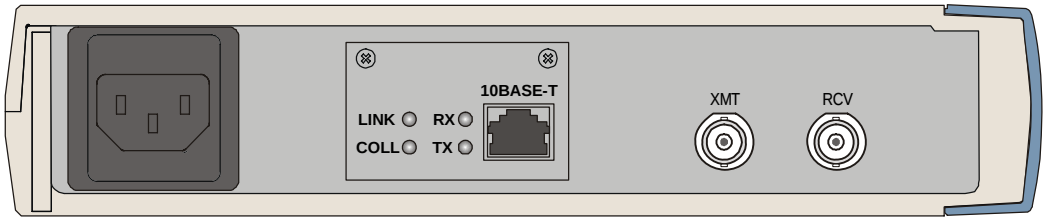

Figure B-2. ASM-40 Rear Panel with IR-ETH/UTP

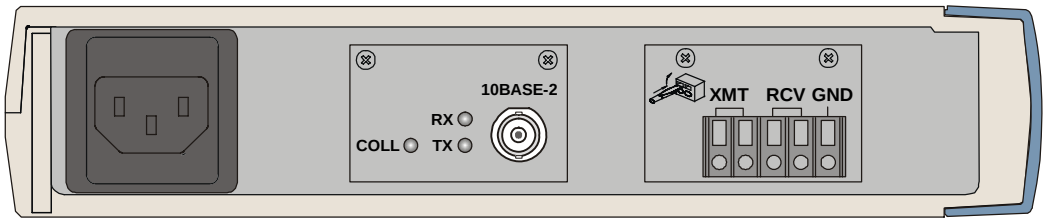

Figure B-3. ASM-40 Rear Panel with IR-ETH/BNC

Table B-1. RJ-45 Connector Pinout

Pin	Signal
3	RCV (+)
6	RCV (-)
1	XMT (+)
2	XMT (-)
–	GND

B.2 Technical Specifications

General	*LAN Table*	10,000 addresses
	Filtering and Forwarding	15,000 pps
	Buffer	256 frames
	Delay	1 frame
LAN	*Standard*	Conforms to IEEE 802.3/Ethernet
	Data Rate	10 Mbps (20 Mbps 10BaseT FDX)
	Connectors	• 10BaseT (UTP): Shielded RJ-45 • 10Base2: BNC connector
WAN	*Protocol*	HDLC
	Data Rate	According to the modem transmission rate

B.3 Installation and Operation

Figure B-4 shows the IR-ETH layout, the locations of the DIP switch, and the rear panel components for the UTP version.

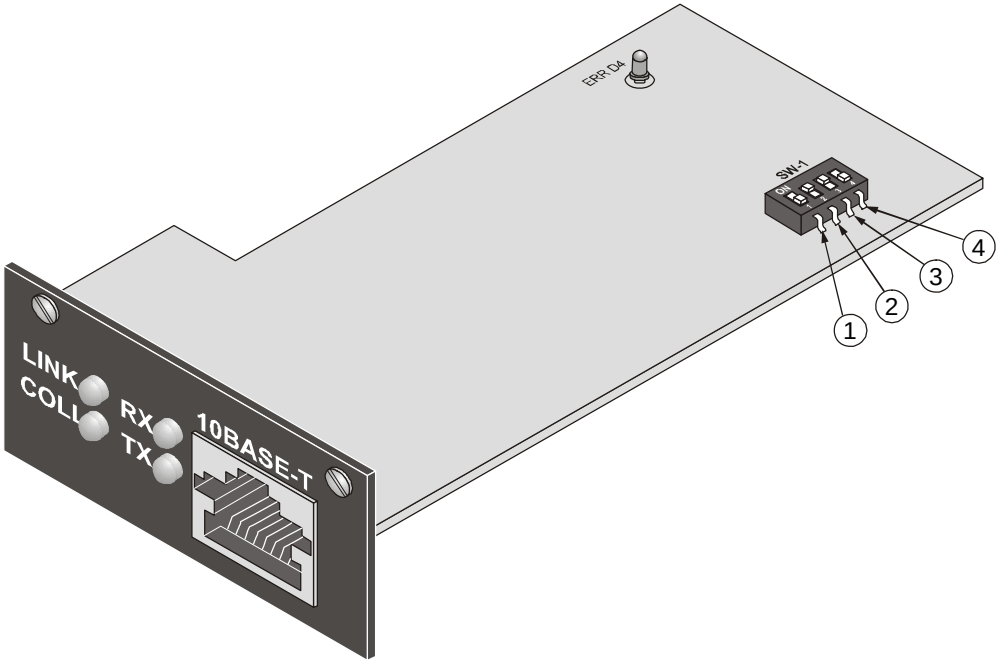

Figure B-4. IR-ETH Module Layout (UTP Option)

Opening the ASM-40 Case

You must open the ASM-40 case in order to access the DIP switch located on the IR-ETH board.

➤ **To open the ASM-40 case:**

1. Disconnect the power cord from the power source.
2. Slide the blue side panel forward to detach it from the case.
3. Unscrew the two screws located on the bottom panel at the rear end of the unit.
4. Separate the two halves of the ASM-40 case by lifting the top cover at the end of the unit and sliding it forward.

Setting the DIP Switch

Set the IR-ETH DIP switch according to *Table B-2*.

Table B-2. DIP Switch Settings

Switch Number	Name	Description	Default Setting
1	SQ/FD	ON – Ethernet full-duplex mode OFF – Ethernet half-duplex mode	OFF
***Note**: The SQ/FD switch is not used in the Ethernet bridge with the BNC connector option.*			
2	CMP	ON – Strips padding bits inserted in 64-byte frame OFF – Transmits frames over WAN as is	ON
3	FIL	ON – Passes only frames destined for another LAN OFF – Disables LAN filter, passes all frames transparently	ON
4		N/A	OFF

Closing the ASM-40 Case

➤ **To close the ASM-40 case:**

1. Position the lower half of the ASM-40 case on the flat surface.
2. Return the top cover. Make sure that the front board pushbuttons fit the front panel opening correctly, and the top cover guides enter the corresponding recesses at the end of the unit.
3. Secure the two screws located at the end of the unit.
4. Fit the inside tabs of the blue side panel into the unit case grooves, and slide the side panel until it snaps into place.

LED Indicators

Table B-3 lists the IR-ETH LED indicators and describes their functions.

Table B-3. IR-ETH Bridge LED Indicators

LED Name	Description	Location	Color
LINK	ON – Good link integrity (available only in the 10BaseT version)	Panel	Green
COLL	ON – Collision on the attached Ethernet segment	Panel	Yellow
RX	ON – Data is received from the Ethernet attached segment	Panel	Yellow
TX	ON – Data is transmitted from the modem to the Ethernet segment	Panel	Yellow
ERR D4	ON – Bridge buffer overrun occurred	On board	Red

Connecting the LAN

For 10BaseT installation, either a straight cable or a cross cable may be required. Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note *Hubs usually do implement the crossover function internally while network interface cards and other devices do not.*

Appendix C

IR-ETH/QN (IR-ETH/Q) Interface Module

C.1 Introduction

The IR-ETH/QN interface module includes a high performance self-learning Fast Ethernet bridge, which is connected to the LAN via a single 10BaseT or 100BaseT port, operating in full or half duplex and providing simple and cost-effective interconnection between 10/100BaseT LANs. The IR-ETH/QN interface module also supports IEEE 802.1/P frames and IEEE 802.1/Q frames, enabling VLAN applications.

Note *ASM-40 units ordered with the IR-ETH/Q interfaced are supplied with the functionally equivalent IR-ETH/QN interface.*

The module automatically learns MAC addresses of the LAN to which it is connected. Its LAN table stores up to 1,024 addresses with 5-minute automatic aging.

Filtering and forwarding is performed at the maximum theoretical rate of 150,000 packets per second (wire speed). The buffer with 0.512 Mbit SRAM can hold 85 frames with a throughput latency of one frame. The forwarding of the multicast messages from LAN to WAN can be disabled.

Figure C-1 shows a typical application using ASM-40 with IR-ETH/QN module.

Figure C-1. Typical Application of ASM-40 with IR-ETH/QN Module

C.2 IR-ETH/QN Connector

Figure C-2 shows the rear panel of ASM-40, equipped with IR-ETH/QN module. *Table C-1* lists the module's RJ-45 connector pinout.

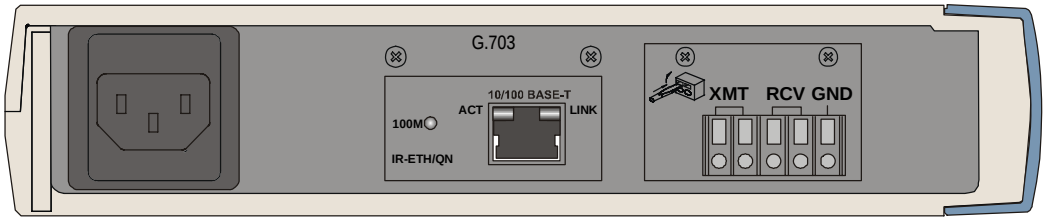

Figure C-2. Rear Panel of ASM-40 with IR-ETH/QN Module

Table C-1. RJ-45 Connector Pinout

Pin	Signal	Function
1	RD (+)	Receive Data (positive)
2	RD (-)	Receive Data (negative)
3	TD (+)	Transmit Data (positive)
6	TD (-)	Transmit Data (negative)

C.3 Technical Specifications

Bridge

LAN Table	1,024 MAC addresses
Aging	5 minute, automatic
Filtering and Forwarding Rate	150,000 packets per second
Buffer Size	85 frames
Delay	1 frame

LAN

Standard	IEEE 802.3/Ethernet V.2, IEEE 802.1q (relevant parts), 802.1p, 802.3x
Data Rate	• 10BaseT: 10 Mbps (20 Mbps in full duplex) • 100BaseT: 100 Mbps (200 Mbps in full duplex)
Transmission Line	4-wire, Category 5 UTP, 19 AWG to 26 AWG
Line Code	• 10BaseT: Manchester • 100BaseT: MLT3

	Connector	RJ-45
WAN	*Protocol*	Point-to-point
	Data Rate	Up to 2048 kbps

C.4 Installation and Operation

To set the internal switch on the IR-ETH/QN interface board, you have to open the ASM-40 case.

Accessing the Internal DIP Switch

➤ **To open the ASM-40 case:**

1. Disconnect all the cables connected to ASM-40.
2. Slide the blue side panel forward to detach it from the case.
3. Unscrew the two screws located on the bottom panel at the rear end of the unit.
4. Separate the two halves of the ASM-40 case by lifting the top cover at the end of the unit and sliding it forward.

Warning

Access to the inside of the equipment is permitted only to the authorized and qualified personnel.

To avoid accidental electric shock, always disconnect the interface cables and the power cord before removing the unit from its casing.

Line voltages are present inside ASM-40 when it is connected to power and/or to the lines. Moreover, under certain fault conditions, dangerous voltages may appear on the lines connected to the unit.

Any adjustment, maintenance and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled technician who is aware of the hazard involved. Capacitors inside the unit may still be charged even after the unit has been disconnected from its source of power.

Note *Figure C-3 illustrates default settings of the SW1 and SW2 DIP switches, as detailed in Table C-2 and Table C-3.*

Note *For ASM-MN-214, no more than 10 IR-ETH/QN cards may be installed at any given time.*

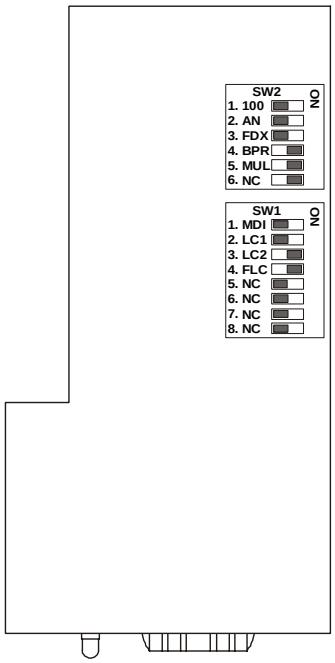

Figure C-3. Location of DIP Switches SW1 and SW2

Setting the DIP Switches

Configure the IR-ETH/QN module by setting the DIP switches SW1 and SW2 in accordance with *Figure C-3*, *Table C-2* and *Table C-3*.

Note *To make the changes effective, you have to restart the ASM-40 unit by turning it off and on.*

Table C-2. DIP SW1 Switch Settings

Section	Name	Description	Possible Settings	Factory Setting
1	MDI	Enables or disables automatic MDI/MDIX crossover	**ON –** Automatic MDI/MDIX crossover is disabled	
			OFF – Automatic MDI/MDIX crossover is enabled	OFF
Note: *Automatic MDI/MDIX crossover function is available only if the autonegotiation is enabled (see Table C-3).*				
2,3	LC1, LC2	–	–	–
4	FLC	Enables or disables flow control	**ON** – Flow control is enabled	ON
			OFF – Flow control is disabled	
5-8	NC	–	–	–

Note *Sections 2, 3, 5, 6, 7 and 8 of the SW1 DIP switch are factory-set and must not be moved by the user.*

Table C-3. DIP Switch SW2 Settings

Section	Name	Description	Possible Settings	Factory Setting
1	100	Selects the LAN speed	**ON** – LAN speed is set to 10 Mbps **OFF** – LAN speed is set to 100 Mbps	 OFF
2	AN	Controls the LAN autonegotiation	**ON** – LAN autonegotiation is disabled **OFF** – LAN autonegotiation is enabled	 OFF
3	FDX	Selects the LAN mode	**ON** – LAN half duplex mode **OFF** – LAN full duplex mode	 OFF
4	BPR	Controls the backpressure	**ON** – Backpressure is enabled **OFF** – Backpressure is disabled	ON
5	MUL	Controls LAN to WAN multicasting	**ON** – Multicast messages from LAN to WAN are not blocked **OFF** – Multicast messages from LAN to WAN are blocked	ON
6	NC	–	–	ON

Note

- *Section 6 of the SW2 DIP switch is factory-set and must not be moved by the user.*
- *When autonegotiation is enabled, LAN speed and LAN mode are configured automatically (sections 1 and 3 are disabled).*

After completing the internal settings, reinstall the top cover.

➤ **To reinstall the ASM-40 top cover:**

1. Position the lower half of the ASM-40 case on a flat surface.
2. Return the top cover. Make sure that the top cover guides enter the corresponding recesses at the end of the unit.
3. Secure the two screws located at the end of the unit.
4. Fit the inside tabs of the blue side panel into the unit case grooves, and slide the side panel until it snaps into place.

LED Indicators

Table C-4 lists the IR-ETH/QN rear-panel LED indicators and describes their functions.

Table C-4. LED Indicators

LED Name	Color	Description	Location
LINK	Green	ON – LAN is connected to the IR-ETH/QN module	Connector
ACT	Yellow	ON – LAN is receiving/transmitting data	Connector
100M	Green	ON – LAN is operating at 100 Mbps OFF – LAN is operating at 10 Mbps	Panel

Connecting the LAN

Use either a straight cable or a cross cable for the LAN connection.
Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note *Hubs usually implement the crossover function internally, while NICs and other devices do not.*

Appendix D

IR-IP Interface Module

D.1 Introduction

Overview

IR-IP is a high-performance, miniature IP router based on RAD's unique IP router chip, the ChipRouter.

IR-IP works by taking each Ethernet frame from the LAN and determining whether the IP packet is destined for the IP net on the Ethernet LAN. If not, IR-IP forwards the packet to the WAN (line) link. IP packets received from the WAN link are automatically forwarded to the LAN if the IP net matches.

IR-IP includes hardware filters which handle all filtering operations at wire speed from both LAN-to-WAN and WAN-to-LAN, without dropping a single packet. Filtering and forwarding are performed at the maximum rate of 35,000 and 30,000 frames per second (wire speed), respectively. The buffer can hold 256 frames of maximum size of 1534 bytes and a throughput latency of one frame.

IR-IP is available with 10BaseT (UTP) interface and is fully compliant with IEEE 802.3/Ethernet v2. The IR-IP interface can also operate in full-duplex Ethernet applications.

ASM-40 equipped with IR-IP interface module can be used as a Frame Relay Access Device (FRAD) with an integral IP router. RFC 1490 is supported for a single DLCI on the WAN link. Detection of the DLCI and the maintenance protocol is performed automatically. This allows the IR-IP to be used as the termination unit of IP services over Frame Relay at the customer premises, opposite a Frame Relay switch in the backbone.

Alternatively, Point-to-Point Protocol (PPP) can be run on the WAN link with automatic negotiation on power-up, as well as support for PAP and CHAP authentication. With this feature, IR-IP can operate opposite any PPP compliant access server or backbone router.

IR-IP supports HDLC, which is especially important for broadcast and multicast applications where bandwidth overhead is critical.

IR-IP supports IP multicast at wire speed, making it suitable for any multicast environment including high speed downstream environments, such as satellite and xDSL. Users on the LAN who register with IR-IP for an IP multicast group using the IGMP protocol filter IP multicast packets at wire speed.

Management and advanced configuration are performed via Telnet.

Application

Figure D-1 shows a typical application of the ASM-40 modem equipped with the IR-IP interface module.

Figure D-1. Typical Application of ASM-40 with IR-IP

D.2 Technical Specifications

Router	*LAN IP Net*	Up to 256 hosts on LAN IP net
	Filtering and Forwarding	30 kbps/35 kbps
	Buffer	256 frames (maximum size – 1534 bytes)
	Delay	1 frame
LAN	*Standard*	Conforms to IEEE 802.3/Ethernet v2
	Data Rate	10 Mbps (20 Mbps 10BaseT in full duplex topology)
	Connector	10BaseT (UTP): Shielded RJ-45
WAN	*Protocols*	• PPP (PAP/CHAP) • Frame Relay (RFC 1490) • HDLC

D.3 Physical Description

Figure D-2 shows the rear panel of ASM-40 with the IR-IP interface module.

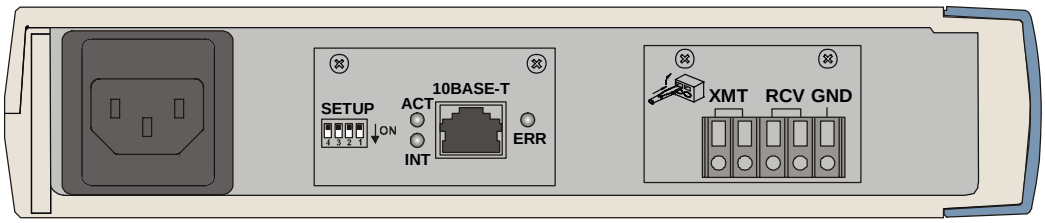

Figure D-2. Rear Panel of ASM-40 with the IR-IP Module

IR-IP LEDs

IR-IP contains three LEDs, which indicate module activity. *Table D-1* lists the LEDs functions.

Table D-1. IR-IP LEDs Functions

Name	Type	Function
INT	Green LED	ON – LAN integrity is established.
ACT	Yellow LED	Blinking – Transmit/receive activity is detected on the Ethernet link.
ERR	Red LED	ON – Buffer overflow occurred (during normal operation). During power-up, provides additional indications, as described below.

IR-IP DIP Switch (Stand-alone version)

IR-IP interface module on the stand-alone version of ASM-40 contains a four-section DIP switch, as seen in *Figure D-3*. *Table D-2* lists the DIP switch functions.

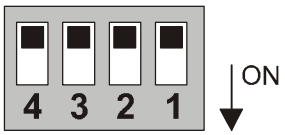

Figure D-3. IR-IP DIP Switch (standalone version)

Table D-2. IR-IP DIP Switch Functions

No	Function	Values*
1	Enables IR-IP to learn its IP	ON – IP address learning is enabled **OFF** – IP address learning is disabled
2	Selects the WAN protocol	ON – PPP protocol **OFF** – Frame Relay protocol
3	Selects the LAN mode	ON – Full duplex operation **OFF** – Half duplex operation
4	Controls the remote WAN test loopback, which returns packets received from the WAN back toward the WAN	ON – The test loopback is activated **OFF** – The test loopback is disabled

* Values in bold are default factory settings.

IR-IP DIP Switch (Card version)

IR-IP interface module on the card version of ASM-40 contains a six-section DIP switch, as seen in *Figure D-3*. *Table D-2* lists the DIP switch functions.

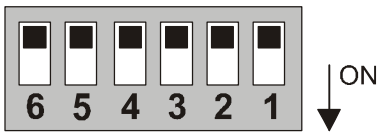

Figure D-4. IR-IP DIP Switch (card version)

Table D-3. IR-IP DIP Switch Functions

No	Function	Values	Default Setting
1	–	N/A	–
2	Controls the remote WAN test loopback. Returns packets received from the WAN back toward the LAN	**ON** – Test loopback is activated **OFF** – Test loopback is disabled	**OFF**
3	Selects the LAN protocol	**ON** – Full-duplex operation **OFF** – Half-duplex operation	**OFF**
4	Selects the WAN mode	**ON** – PPP protocol **OFF** – Frame Relay protocol	**OFF**
5	Enables IR-IP to learn its IP address	**ON** – IP address learning is enabled **OFF** – IP address learning is disabled	**OFF**
6	Allows the user to operate the module in case of the IP address and/or Telnet password are forgotten	**ON** – Forces the default IP address and no password protection **OFF** – Card operates as configured	**OFF**

Table D-4 lists the pinout of the IR-IP RJ-45 connector.

Table D-4. RJ-45 Pinout

Pin	Name	Function
1	TD (+)	Transmit data (positive)
2	TD (-)	Transmit data (negative)
3	RD (+)	Receive data (positive)
6	RD (-)	Receive data (negative)

D.4 IR-IP Management Subsystem, General

Introduction

The IR-IP interface module management subsystem supports the following functions:

- Preliminary configuration
- Configuration of management access parameters
- Advanced configuration of IR-IP parameters
- Collection and display of statistical performance data
- Maintenance functions, which include:
  - Software downloading
  - Resetting of various subsystems
  - Display of error log
  - Ping utility, for checking IP connectivity.

The management subsystem of the IR-IP interface module is a separate, independent entity.

The communication with the IR-IP management subsystem is made through the local LAN interface connector of the IR-IP module, designated 10BASE-T, using the Telnet protocol. Passwords can be used to prevent unauthorized access.

Accessing the IR-IP Management Subsystem

The IR-IP interface module must be configured in accordance with the specific requirements of the user's application before it can be used in the user's network. As a result, it is not possible to supply default parameters to enable IR-IP to start service without any preliminary configuration.

Therefore, to enable the user to establish Telnet communication and configure IR-IP, IR-IP is delivered with a default set of parameters. The default parameters are automatically used:

- Before the IP router is configured by the user, e.g., when a new ASM-40 with IR-IP interface module is put into operation
- After the user's configuration parameters have been erased.

When the factory-default parameters are used, the ERR indicator located on the ASM-40 rear panel, near the IR-IP Ethernet interface connector flashes rapidly (about three times per second).

Note *The flashing of the ERR indicator also serves as a warning to the user that the IR-IP WAN interface does not send, nor does it receive packets, and therefore IR-IP can be accessed only from the LAN.*

After configuring IR-IP, it starts normal operation and routes the traffic in accordance with the user-selected configuration parameters.

To change the parameters of an already-configured IR-IP, establish communication from a Telnet host using the assigned IP address.

Default IP Communication Parameters

The default IP communication parameters of the interface module are:

- The default IP address of the IR-IP Ethernet port is 192.168.205.1, and the default IP subnet mask is 255.255.255.252.
- The port will accept IP communication only from the IP address 192.168.205.2. Therefore, as long as the factory defaults are in effect, you must assign this address to the Telnet host used to configure IR-IP.

Using the IP learning mechanism, as explained below you can change the default parameters.

Note *In the default configuration, the IR-IP WAN interface is disabled. In order to enable the WAN interface, you have to modify the Ethernet port address or the IP subnet mask.*

D.5 Performing Preliminary Configuration

General

The software necessary for performing all the management and configuration functions is stored in the IR-IP interface module, and therefore you only need a regular Telnet host to perform all the activities described in this appendix.

A Telnet host is any computer, e.g., an IBM PC or compatible that fulfills the following minimum requirements:

- A standard 10BaseT Ethernet interface
- A TCP/IP protocol stack, and therefore is capable of supporting IP communication through the Ethernet interface
- Telnet client software
- A ping utility.

Outline of Preliminary Configuration

➤ To perform the preliminary configuration procedure:

1. Connect the Telnet host to the IR-IP interface module.
2. Configure the Telnet host to enable communication with the IR-IP interface module using the default IP parameters.
3. Establish communication with IR-IP and assign the prescribed IP address to its LAN interface.

4. Establish again communication with IR-IP and continue the preliminary configuration in accordance with the *Quick Setup Menu* section below.

Connecting the Telnet Host

Before starting the management and configuration activities, it is necessary to establish IP communication between your Telnet host and the IR-IP interface module. For this purpose, it is necessary to provide a communication path.

Because of the method used to assign an IP address to IR-IP Ethernet port, it is recommended to connect the Telnet host directly to the IP router 10BASE-T connector. This is made by connecting an Ethernet cross cable between the Ethernet connector of the Telnet host and the IR-IP connector.

However, you may also connect through a common LAN: in this case, connect your Telnet host and IR-IP to Ethernet hub ports using straight cables.

Preliminary Telnet Host Configuration

You can use the IP learning mechanism to configure the IP communication parameters of the IR-IP LAN interface. In this case, skip to the *Assigning the Router LAN Interface Address* section below.

If you prefer to use the factory-default parameters to establish IP communication between your Telnet host and IR-IP, configure the Telnet host as follows:

1. Temporarily configure the host IP address as 192.168.205.2.
2. The initial destination IP address to be used by the host is 192.168.205.1.

Note *The first step in the preliminary configuration process is to assign the desired IP address to the LAN interface of the IR-IP interface module.*

After an IP address is assigned and saved, you must change the destination IP address of the Telnet host to the new address, otherwise it is not possible to continue the configuration process. At the same time, you can also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

Assigning the Router LAN Interface Address

The IP address of the IR-IP LAN interface must be configured as part of the preliminary configuration process. To simplify this process, IR-IP includes a simple and convenient IP address learning mechanism.

The IP address can be configured and changed at any time, even after the complete IR-IP configuration process has been performed, because it does not affect other configuration parameters. Moreover, the IP subnet mask is automatically adapted to the new IP address.

IP Learning Mechanism

To simplify the configuration process, IR-IP has a special mechanism for configuring the IP address of its LAN interface. Setting section 1, called IP address learning, of the IR-IP DIP switch (*Figure D-3*) to ON enables this mechanism.

The IP learning mechanism enables IR-IP to learn its LAN interface IP address by receiving frames sent by a ***ping*** utility to the prescribed LAN IP address.

Note

To use the IP learning mechanism, you do not need to know the current address of IR-IP LAN interface, but only the prescribed IP address.

The IP address is actually retrieved from the ARP frames sent during pinging to locate the ***ping*** destination, not from the ***ping*** frames.

To ensure that the process is correctly performed, it is recommended to check the contents of the ARP table before starting the ***ping*** utility, to make sure that it does not contain the address to be assigned to the IP router LAN interface.

➤ **To view and edit the ARP table contents:**

If the Telnet host you are using runs under Microsoft Inc. Windows™ 95, 98 or NT, use the following procedure to view and edit the ARP table contents:

1. Display the table using the **`arp -a`** command.
2. If the table includes the intended IP address, remove it from the table using the **`arp -d`** command.

If for some reason the IP learning process does not succeed, before repeating it make sure to remove the IP address from the table.

Assigning a LAN IP Address to a New IR-IP

The following procedure enables you to configure the LAN IP address of a new IR-IP router, i.e., a router using the default parameters (see the *Accessing the IR-IP Management Subsystem* section above).

If ASM-40 is already operating, skip Step 2 in the following procedure.

➤ **To configure the IP router LAN address:**

1. Make sure the preparations described above have been completed, including the configuration of the ***ping*** utility.
2. Turn ASM-40 on and monitor the IP router indicators:
   - The INT indicator turns on
   - The ERR indicator lights steadily for approx. 15 seconds, and then starts flashing at a rapid rate (about three times per second).

     If the ERR indicator turns off, skip to the *What to Do If ...* section below.
3. Set section 1 of IR-IP DIP switch to ON.

   The ERR indicator starts flashing faster (approximately four times a second).
4. Send a ***ping*** to the new address to be used by IR-IP. A confirmation should be received after the third ***ping***: after the confirmation, the flashing will slow down to approximately twice a second.

   If your host does not begin to receive ***ping*** replies after three unsuccessful attempts, skip to the *What to Do If ...* section below.
5. Return section 1 of the IR-IP DIP switch to the OFF position.

The ERR indicator must turn off.

At this stage, the communication with IR-IP router is lost, because its IP address has been changed. Therefore, you must reconfigure the destination IP address of the Telnet host. If you wish, you may also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

After changing the destination IP address of the Telnet host, it is recommended to turn ASM-40 off for a few seconds and then back on, before continuing the configuration of the IP router in accordance with the *Quick Setup Menu* section below. At this time, in Step 2 the ERR indicator turns off after the 15-second interval.

Changing the LAN IP Address of a Configured IR-IP

The LAN IP address of an already-configured IR-IP can be changed while it operates, this means it is not necessary to turn ASM-40 off before starting the configuration procedure. Note however that the IP traffic flow through IR-IP will be disrupted until the other stations in the IP network learn the new address.

To change the LAN IP address of an already-configured IR-IP, use the procedure described above for a new IR-IP with the following differences:

1. Configure the destination address of the ***ping*** utility to the new LAN interface IP address. It is not necessary to change the Telnet host source address.
2. When ready, set section 1 of the IR-IP DIP switch to ON.

   The ERR indicator starts flashing faster (approximately four times a second).
3. Perform Steps 4, 5 of the procedure used for a new IR-IP.

What to Do If ...

➤ **The INT indicator does not light immediately after ASM-40 is turned on**

The IR-IP interface module does not receive power from the ASM-40 power supply. Service is required.

Note *After the power-up process ends, the INT indicator shows LAN integrity. It may stay turned off without indicating power supply failure.*

➤ **The ERR indicator does not light immediately after ASM-40 is turned on**

IR-IP is faulty and must be replaced.

➤ **After turn-on, the ERR indicator lights for 15 seconds and then turns off. ACT does not light, and there is no response from IR-IP**

No software loaded into IR-IP. Download software using the procedure described in the *New Software Download Menu* section below.

➤ **After turn-on, the ERR indicator lights for 15 seconds, and then turns off. ACT lights from time to time, but there is no response from IR-IP**

IR-IP has been configured. If you do not know the current IP address of the LAN interface, erase IR-IP router configuration using the procedure given in the *Erasing User's Configuration* section below.

➤ **No ping replies from IR-IP**

- If your host does not begin to receive ***ping*** replies after three unsuccessful attempts, check the physical connection path between the Telnet host Ethernet interface and the IR-IP 10BASE-T connector.

➤ **The IP learning process is not successful**

- Check that the prescribed IP address does not appear in the ARP table.

D.6 IR-IP Management Utility

General Operating Procedures

The IR-IP interface module is managed via a simple, menu-driven utility that uses a basic terminal user interface. A typical screen is shown in *Figure D-5*.

As seen in *Figure D-5*, each screen has a header that identifies the device being configured and its logical name, assigned by the user, followed by the running software revision and date. The bottom line of the screen displays prompts that guide you in the execution of the various activities.

Use the following general procedures to perform the desired activity:

- To change a parameter or to select a menu item, type the corresponding line number.
- For a parameter, which has a discrete set of values, the parameter values are enclosed in brackets [ ]. To select a new value, press the spacebar to scroll among the available values until the desired value is displayed, and then press **<Enter>** to select the displayed value.
- To enter a value which requires free text entry, type in the desired string and then press **<Enter>**. Use backspace to erase the current string.
- After all the parameters have been selected, a prompt appears, requesting that you confirm the changes.

Note

For proper display of the screens, you must:

- *Select a fixed-pitch system font for the display. Use your operating system documentation to find how to select a proper font.*
- *Configure the Telnet utility to use VT-100 terminal emulation.*

Starting a Management Utility

The management utility is started automatically when Telnet communication is established. If password protection is enabled (see the *Management Access Menu* section below), you will be prompted to enter the Telnet password. The opening screen, which appears after the Telnet session activation, is the IR-IP Main menu (see *Figure D-5*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

1. Quick Setup
2. Management Access
3. Advanced Setup
4. Device Control
5. View
6. Diagnostic Tool (PING terminal)

Press one of the numbers to select or ESC:
```

Figure D-5. IR-IP Main Menu

To end the utility, press **<Esc>** when the Main menu is displayed. This will also end the Telnet session.

Menu Structure of Management Utility

Figure D-6 shows the menu structure of the IR-IP management utility.

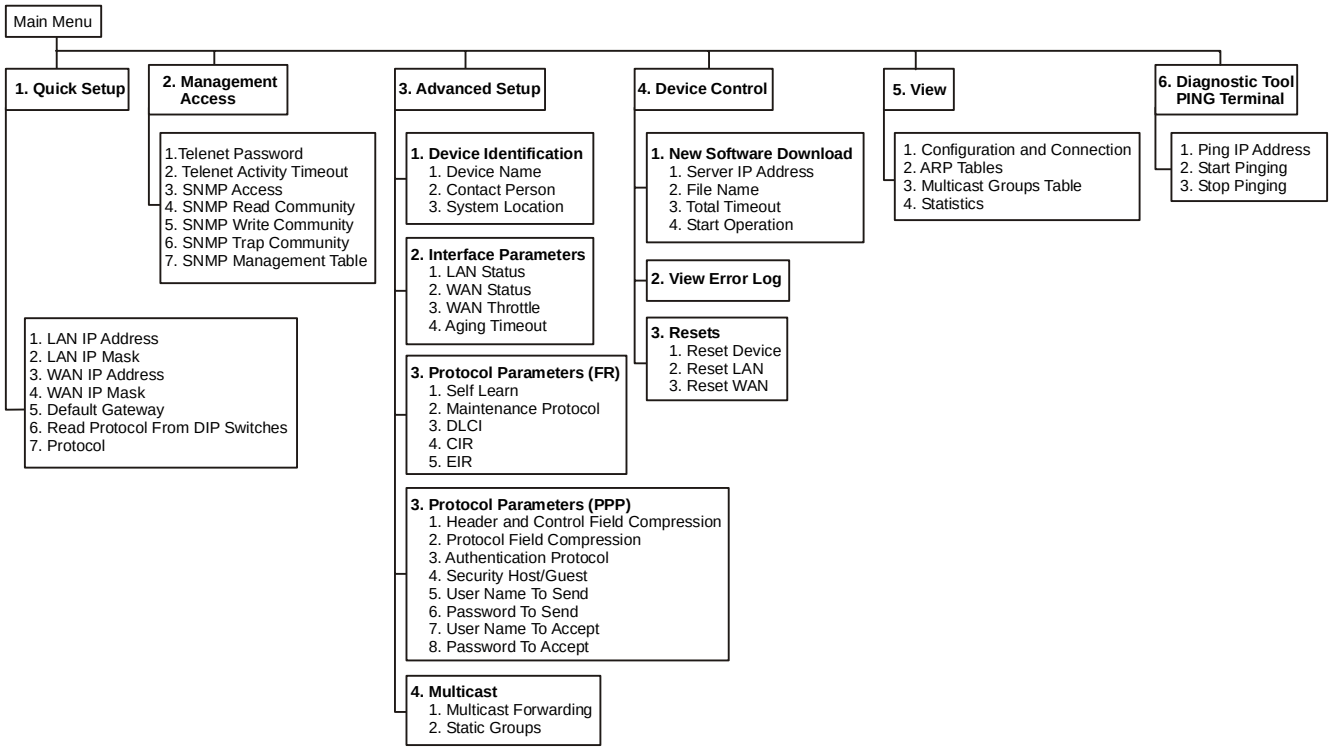

Figure D-6. Management Utility, Menu Structure

D.7 Quick Setup Menu

The Quick Setup menu is used to select the main parameters' values that must be defined before you start using IR-IP.

Use the Advanced Setup menu (see the *Advanced Setup Menu* section below) to specify values for other IR-IP configuration parameters not included in this menu.

➤ To access the Quick Setup menu:

- From the Main menu, type **1**.

  The Quick Setup menu appears (*Figure D-7*).

```
IR_IP                        <IR-IP>                    S/W Ver. 1.00 31/IR
(date)
Quick Setup
=====================================================================
1. LAN IP Address                                       :192.168.100.001
2. LAN IP Mask                                          :255.255.255.000
3. WAN IP Address (empty for unnumbered)                :...............
4. WAN IP Mask (empty for unnumbered)                   :...............
5. Default Gateway (empty - WAN interface)              :...............
6. Read Protocol From DIP Switches                      :[ Yes ]
7. Protocol                                             :[ Frame Relay ]

Press one of the numbers to select or ESC:
```

Figure D-7. Quick Setup Menu

LAN IP Address

Used to enter the IP address for the IP router LAN interface. This is the address to which nodes connected to the local LAN send packets addressed to the WAN.

LAN IP Mask

Used to enter the IP subnet mask. The IP router supports a maximum of 254 hosts on the LAN, therefore you must use Class C subnet masks. The basic subnet IP mask for Class C addresses, which supports the maximum possible number of hosts, 254, is 255.255.255.0. To help you understand the selection of IP subnet masks, *Figure D-8* provides a configuration example for a LAN with 6 nodes: the IP subnet mask for a 6-node IP network is 255.255.255.248.

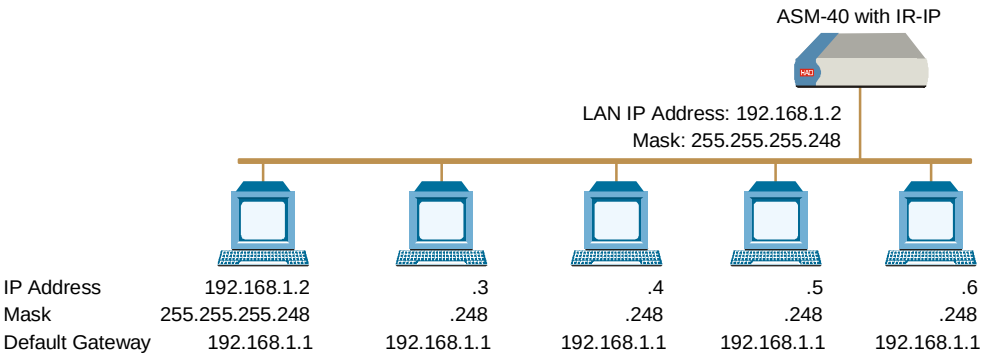

Figure D-8. Selecting the IP Subnet Mask

WAN IP Address

Used to enter the IP address for the IR-IP WAN interface, i.e., the IP address to be used by IP hosts on the WAN to reach this IR-IP interface module.

If the WAN IP Address field remain blank, IR-IP operates in the Unnumbered Router Mode.

WAN IP Mask

Used to enter the IP subnet mask for the WAN interface.

Default Gateway

Operation without Default Gateway

The IP interface module is intended to enable the extension of LANs through the ASM-40 link. Therefore, its default routing operation is different from the default routing operation of standard IP routers:

- IR-IP forwards packets with destinations not located on the local LAN through the WAN interface
- Packets received from the WAN interface and destined to hosts located on the local LAN are forwarded to the LAN; other packets are discarded.

The default operation is used when the Default Gateway field is blank.

Operation with Default Gateway

You can instruct IR-IP to send packets with destinations not located on the local LAN to a specific router, which is called the ***default gateway***. The default gateway must be connected to the local LAN.

To use this option, enter the IP address of another router attached to the local LAN in the Default Gateway field.

Note

It is very important to obtain the correct parameters from the system administrator or ISP. The most common problem when establishing an IP connection is incorrect configuration of IP parameters and default gateway. Do not try to guess these parameters.

Read Protocol from DIP Switches

Selecting YES for this parameter forces IR-IP router card to use the WAN protocol selected by section 2 of its DIP switch: PPP or Frame Relay.

If you want to be able to select the WAN protocol by means of the Protocol field (parameter 7) of the Quick Setup menu, select NO.

Protocol

Used to select the WAN protocol to be used by the IP router card: PPP, HDLC or Frame Relay.

This parameter is available only if the Read Protocol from DIP Switches parameter is set to NO.

D.8 Management Access Menu

The Management Access menu is used to enable the use of passwords to protect the access to IR-IP management utility, and control the inactivity time-out interval.

When password protection is enabled, a Telnet management session can start only after the correct password is entered.

➤ To access the Management Access menu:

- From the Main menu, type **2**.

  The Management Access menu appears (*Figure D-9*).

```
IR_IP                          <IR-IP>                    S/W Ver. 1.00 31/IR
(date)

Quick Setup
Management Access
=============================================================================
                      1. Telnet Password              :..........
                      2. Telnet Inactivity Timeout (min):300..
                      3. SNMP Access                  :Disabled
                      4. SNMP Read Community          :public....
                      5. SNMP Write Community         :public....
                      6. SNMP Trap Community          :public....
                      7. SNMP Management Table        :>>>

Press one of the numbers to select or ESC:
```

Figure D-9. Management Access Menu

Note *Since the IP router card does not support SNMP management, the SNMP Read Community, SNMP Write Community, SNMP Trap Community, and SNMP Management Table parameters are not used.*

Telnet Password

By default, management access to IR-IP via Telnet is unrestricted. To restrict access, enter a Telnet password by selecting **1** in the Management Access menu. The password can include up to 10 characters, and is case-sensitive. The next time a Telnet session is opened, a password must be entered to enable you to access the IR-IP menus.

At any time, only one Telnet connection to IR-IP is permitted. Any attempt to open an additional connection while the current session is open is rejected.

Telnet Inactivity Timeout

This parameter specifies the time a Telnet session is kept open when there is no keyboard activity. When the specified time-out expires, the Telnet session is closed and another user can access IR-IP.

D.9 Advanced Setup Menu

The Advanced Setup menu is used to select the desired group of IR-IP configuration parameters.

The parameters accessed through Advanced Setup menu supplement the parameters available on the Quick Setup screen, by providing control over all the other IR-IP parameters.

➤ To access the Advanced Setup menu:

- From the Main menu, press **3**.

  The Advanced Setup menu appears (*Figure D-10*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
=========================================================================
     1. Device identification
     2. Interface Parameters
     3. Protocol Parameters
     4. Multicast IP

Press one of the numbers to select or ESC:
```

Figure D-10. Advanced Setup Menu

Device Identification Menu

The Device Identification menu is used to define and store in the IR-IP logistic information: the logical name of IR-IP, information on the contact person and device location.

➤ To access the Device Identification menu:

- From the Advanced Setup menu, type **1**.

The Device Identification menu appears (*Figure D-11*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
=====================================================================
     1. Device Name                          :IR-IP..
     2. Contact Person                       :Name of contact Person
     3. System Location                      :The location of this device

Press one of the numbers to select or ESC:
```

Figure D-11. Device Identification Menu

Device Name

Select this parameter to assign an arbitrary name to IR-IP for identification by the system manager (up to eight characters). The assigned name is displayed in the screen header.

Contact Person

Select this parameter to enter the name of the person to be contacted with matters pertaining to this equipment unit.

System Location

Select this parameter to enter the physical location of the device.

Interface Parameters Menu

The Interface Parameters menu is used to control the operation of IR-IP interfaces.

➤ To access the Interface Parameters menu:

- From the Advanced Setup menu, type **2**.

The Interface Parameters menu appears (*Figure D-12*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.............................................................
     Device identification
     Interface Parameters
=============================================================
     1. LAN Status                                    :[ Open  ]
     2. WAN Status                                    :[ Open  ]
     3. WAN Throttle                                  :[ Full  ]
     4. Aging Timeout (min)                           :5.

Press one of the numbers to select or ESC:
```

Figure D-12. Interface Parameters Menu

LAN Status

Used to enable/disable the flow of packets through LAN interface:

- Open – the flow of packets is enabled.
- Closed – the flow of packets is disabled. As a result, IR-IP does not accept, nor sends packets to the LAN, but its WAN interface may still be active, and can interact with other IP hosts on the WAN.

WAN Status

Used to enable/disable the flow of packets through the WAN interface:

- Open – the flow of packets is enabled.
- Closed – the flow of packets through the WAN interface is disabled. As a result, IR-IP does not accept from, nor sends packets to the WAN. However, the LAN interface of the IP router is still active.

WAN Throttle

This parameter specifies the maximum data rate at which frames are sent to the WAN (i.e., to the ASM-40 line).

The available selections are:

- 64 kbps
- 128 kbps
- 256 kbps
- 512 kbps
- 1024 kbps
- Full (no restriction on the rate).

Since the IP router buffers have a limited capacity (256 frames), it is recommended to select the WAN Throttle parameter in accordance with the line rate.

Aging Timeout

Used to specify the time after which inactive LAN stations are removed from the IR-IP ARP table.

A station is defined as inactive when no IP traffic is received from it by the IR-IP LAN interface.

WAN Protocol Parameters – Frame Relay Protocol Menu

The Frame Relay Protocol Parameters menu is used to configure the parameters Frame Relay WAN for protocol (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure D-7*.

➤ **To access the Protocol Parameters menu:**

- From the Advanced Setup menu, type **3**.

Self Learn

Used to specify whether the Frame Relay DLCI and maintenance protocol is learned automatically (ENABLED), or is manually entered (DISABLED).

Maintenance Protocol

When the Self Learn parameter is DISABLED, use this parameter to specify the desired maintenance protocol.

DLCI

When the Self Learn parameter is DISABLED, use this parameter to specify the DLCI used for exchanging maintenance protocol messages.

CIR

Used to specify the maximum amount of data, in bits, which the Frame Relay network guarantees to transfer during the measurement interval (the measurement interval is usually one second).

The value of this parameter is obtained from your Frame Relay service provider.

EIR

Used to specify the maximum amount of data, in bits, that the Frame Relay network will attempt to deliver during the measurement interval. The value of this parameter is obtained from the Frame Relay service provider.

A typical Frame Relay Protocol Parameters menu is shown in *Figure D-13*.

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
=====================================================================
     1. Self Learn                                 :[ Enabled  ]
     2. Maintenance Protocol                       :[ ANSI T1.617 ANNEX D ]
     3. DLCI (0-None)                              :0..
     4. CIR                                        :0.......
     5. EIR                                        :64000...

Press one of the numbers to select or ESC:
```

Figure D-13. Frame Relay Protocol Parameters Menu

WAN Protocol Parameters – PPP Protocol Menu

The PPP Protocol Parameters menu is used to configure the parameters PPP WAN for protocol (the WAN protocol is selected by means of the (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure D-7*.

➤ To access the Protocol Parameters menu:

- From the Advanced Setup menu, type **3**.

Header and Control Field Compression

Used to control the use of header and control field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Protocol Field Compression

Used to control the use of protocol field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Authentication Protocol

Used to select the authentication protocol used by an IP router configured as host to validate incoming connections.

Security Host/Guest

This option can be used to configure the IP router either as a guest unit, to be authenticated by another router, or as a host unit, that authenticates other routers.

User Name To Send

The name by which an IP router card configured as guest identifies itself.

Password To Send

The password by which an IP router card configured as guest identifies itself.

User Name To Accept

The user name to be accepted by an IP router configured as host, when an incoming connection request is received.

Password To Accept

The user password to be accepted by an IP router configured as host, when an incoming connection request is received.

A typical PPP Protocol Parameters menu is shown in *Figure D-14*.

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
=====================================================================
     1. Header and Control Field Compression         :[ No  ]
     2. Protocol Field Compression:                  :[ No  ]
     3. Authentication Protocol                      :[ NONE/NONE  ]
     4. Security Host / Guest                        :[ Guest  ]
     5. User Name To Send                            :.................
     6. Password To Send                             :.................
     7. User Name To Accept                          :.................
     8. Password To Accept                           :.................

Press one of the numbers to select or ESC:
```

Figure D-14. PPP Protocol Parameters Menu

Multicast IP Menu

The Multicast IP menu is used to specify the IP multicast frame forwarding parameters, and to access the static multicast groups' table.

➤ **To access the Multicast IP menu:**

- From the Advanced Setup menu, press **4**.

  The Multicast IP menu appears (*Figure D-15*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
     Multicast IP
=====================================================================
     1. Multicast forwarding                          :[ Disable ]
     2. Static groups                                 :>>>

Press one of the numbers to select or ESC:
```

Figure D-15. Multicast IP Menu

Multicast Forwarding

Used to control the forwarding of IP multicast frames. The following selections are available:

- **DISABLED** – Disables multicast forwarding in both directions.
- **LAN to WAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the LAN to the WAN.
- **WAN to LAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN.
- **BIDIRECTIONAL** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, in both directions.
- **WAN to LAN + IGMP** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN. In addition, more groups can be added dynamically (the additional can be viewed using the View menu – *Figure D-20*).
- **TRANSPARENT** – All the IP multicast frames are forwarded, irrespective of the Static Multicast Groups table.

Static Groups

Select this parameter to access the static multicast groups table. The table is used to specify the IP addresses for up to 10 IP multicast groups. You can add, change, or delete each entry in the table (see the prompt line).

➤ To access the Static Groups menu:

- From the Multicast IP menu, type **2**.

The following screen appears:

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

                         Static Multicast Groups Table
                         -----------------------------
   Group IP Address
1.  ...............
2.  ...............
3.  ...............
4.  ...............
5.  ...............
6.  ...............
7.  ...............
8.  ...............
9.  ...............
10. ...............

Press 'A'-add, 'E'-edit, 'D'-delete, 'C'-clear all, 'ESC'-exit:
```

Figure D-16. Static Multicast Groups Table

D.10 Device Control Menu

The Device Control menu is used to download software from TFTP servers and perform interface and device resets.

➤ To access the Device Control menu:

- From the Main menu, type **4**.

The Device Control menu appears (*Figure D-17*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)
Quick Setup
Management Access
Advanced Setup
Device Control
------------------------------------------------------------
     1. New Software Download
     2. View error LOG
     3. Resets
Press one of the numbers to select or ESC:
```

Figure D-17. Device Control Menu

New Software Download Menu

IR-IP operates as a TFTP client, and therefore it is possible to update its software by downloading new software from another computer that operates as a TFTP server.

The New Software Download menu is used to specify the software downloading parameters.

➤ To access the New Software Download menu:

- From the Device Control submenu, type **1**.

  New Software Download menu appears (*Figure D-18*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
.....................................................................
     New Software Download
=====================================================================
     1. Server IP Address                          :...............
     2. File Name                                  :...................
     3. Total Timeout (sec)                        :..
     4. Start operation                            :>>>
Press one of the numbers to select or ESC:
```

Figure D-18. New Software Download Menu

Server IP Address

Used to enter the IP address of the TFTP server.

File Name

Used to enter the name and path of the file to be transferred from the TFTP server.

Total Timeout

Used to enter the time IP router should wait for an acknowledgment from the TFTP server, for example 60 seconds.

Start Operation

After selecting all the necessary parameters, type **4** on the New Software Download screen and then press **<Enter>** to start the downloading.

You can follow the progress of the downloading process (indicated by arrows).

Upon completion of the download process, the unit performs a reset. The Telnet connection is lost and must be restarted if required.

View Error Log Screen

This item of the Device Control submenu is used to view the error log file. This file logs errors detected in IR-IP for debug and technical support purposes.

Resets Menu

The Resets menu allows you to perform reset of IR-IP, or its interfaces.
This operation can be used to restore normal operation after service is disrupted by an abnormal condition. Any data stored in the IR-IP buffers is discarded, and the flow of traffic is temporarily interrupted.

➤ **To access the Resets menu:**

- From the Device Control menu, type **3**.

  The following screen appears:

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
.....................................................................
     New Software Download
     View error LOG
     Resets
=====================================================================
     1. Reset Device
     2. Reset LAN
     3. Reset WAN
Press one of the numbers to select or ESC:
```

Figure D-19. Resets Menu

Reset Device

➤ To restart IR-IP:

- From the Resets menu, type **1**.

  You will be prompted to confirm the reset operation.

Note *Resetting the device will restart the IR-IP interface module, and therefore traffic flow is temporarily interrupted, and the Telnet connection is lost.*

Reset LAN

➤ To reset the LAN interface:

- From the Resets menu, type **2**.

  You will be prompted to confirm the reset operation.

Note *This operation restarts the IR-IP LAN controller.*

To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

Reset WAN

➤ To reset the WAN interface:

- From the Resets menu, type **3**.

  You will be prompted to confirm the reset operation.

Note *Resetting the WAN interface causes the WAN controller to be restarted. This results in renegotiation of the WAN protocol parameters.*

To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

D.11 View Menu

The View menu is used to view the IR-IP configuration data, and display information on its ARP tables, multicast Groups tables and statistics.

➤ To access the View menu:

- From the Main menu, type **5**.

  The View menu appears (*Figure D-20*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
------------------------------------------------------------
     1. Configuration and Connection
     2. ARP Tables
     3. Multicast Groups Table
     4. Statistics

Press one of the numbers to select or ESC:
```

Figure D-20. View Menu

Configuration and Connection

This screen is used to view the configuration parameters of IR-IP. In addition, you can also view the current status of the LAN and WAN interface.

➤ To access the Configuration and Connection screen:

- From the View menu, type **1**.

  The View Configuration screen appears (*Figure D-21*).

```
IR_IP                        <IR-IP>                    S/W Ver. 1.00 31/IR
(date)

VIEW CONFIGURATION
------------------
BOOT Version           :1.06  18.03.1999
Device Name            :IP router card
System Location        :The location of this device
Contact Person         :Name of contact Person

MAC Address            : 00-20-D2-16-3F-9B
Default Gateway        : WAN

Intrf Type             Baud(Kbps)                      Prot    IP Address  IP
Mask                   Status
.....................................................................
LAN   UTP              -------                         Ethr    192.168.205.005
                       255.255.255.000                 Connected
WAN   V.110                  FR                          Not Conn.

Press any key to continue:
```

Figure D-21. View Configuration Screen

ARP Tables

This screen is used to display the IR-IP ARP table. This table shows the IP address assigned to each station on the LAN (the stations are identified by their MAC addresses).

➤ To access the ARP Tables screen:

- From the View menu, type **2**.

The ARP Tables screen appears (*Figure D-22*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

                                  ARP Table
                                  ---------
    IP Address          MAC Address          IP Address    MAC Address
    192.168.205.003     00-40-33-20-C8-3C

Press any key for exit
```

Figure D-22. ARP Tables Screen

Multicast Groups Table Screen

This screen is used to display information about the multicast group IP addresses and their status.

➤ To access the Multicast Groups Table screen:

- In the View menu, type **3**.

The Multicast Groups Table screen appears (*Figure D-23*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Multicast Groups Table
----------------------
     Group IP Address Status           Group IP Address Status
Press any key for exit
```

Figure D-23. Multicast Groups Table Screen

Statistics Screen

The Statistics screen is used to display statistical information on the traffic between the networks connected by IR-IP. The data displayed on this screen enables you to evaluate the IR-IP performance. Two different Statistics screens are used, one for the LAN side and the other for the WAN side.

➤ To access the Statistics menu:

- In the View menu, type **4**.

The LAN and WAN Statistics screens appear (*Figure D-24* and *Figure D-25*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

                            SYSTEM STATISTICS
                            -----------------
     Counter Name               Val    Counter Name                  Val
LAN in Octets                  83504   LAN IP Header Errors          0
LAN Unicast Frames In              1   LAN IP Address Errors         0
LAN Non-Unicast Frames In          9   LAN Alignment Errors          0
LAN Out Octets                 83504   LAN CRC Errors                0
LAN Unicast Frames Out          3560   LAN Single Collisions         0
LAN Non-Unicast Frames Out         0   LAN Multiple Collisions       0
LAN to WAN Frames Passed        1698   LAN Late Collisions           0
LAN IP Datagram Received        2638   LAN Excessive Collisions      0
LAN to CPU Frames Discarded        0   LAN Frames Too Long Errors    0
LAN to WAN Frames Discarded        0   LAN RX FIFO Overrun Error     0
LAN Out Errors                     0   LAN SQE Transmitted           0
LAN RX Frames Errors               0   LAN Deferred Frames           1
LAN MAC Receive Errors             0   LAN Carrier Sense Lost        0
LAN MAC TX Errors                  0   LAN FIFO Underrun             0

     N - Next Screen. ESC - Back To Previous Menu.
     R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure D-24. LAN Statistics Screen

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

                             SYSTEM STATISTICS
                             -----------------
     Counter Name               Val     Counter Name               Val
WAN in Octets                  83504   WAN Alignment Errors       0
WAN Out Octets                  1950   WAN Aborted Frames         0
WAN Out Frames                  1723   WAN Short Frames           0
WAN to LAN Frames Transfer      1698   WAN RX FIFO Overrun Error  0
WAN IP Datagram Received        1723   WAN to CPU Frames Errors   0
WAN to CPU Discarded               0   WAN Frame Too Long Errors  0
WAN to LAN Discarded               0   WAN IP Header Errors       0
WAN Out Errors                     0   WAN IP Addres Errors       0
WAN CRC Errors                     0

PPP Address Error                  0
PPP Control Error                  0
DLCI Unrecognized Error            0
Frame Relay Forward Conge          0
Frame Relay Backward Conge         0

     P - Previous Screen. ESC - Back To Previous Menu.
     R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure D-25. WAN Statistics Screen

D.12 Diagnostic Tool (Ping Terminal) Menu

This section provides information on the diagnostic tool provided with IR-IP (the *ping* utility).

➤ To access the Diagnostic Tools menu:

- In the Main menu, type **6**.

  The Diagnostic Tools menu appears (*Figure D-26*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)
=============================================================================
     1. Ping IP Address                                    :192.168.100.011
     2. Start Pinging                                      :>>>
     3. Stop Pinging                                       :>>>

Press one of the numbers to select or ESC:
```

Figure D-26. Diagnostic Tools Menu

Using the Ping Function

The Ping option is used to confirm IP connectivity by ***pinging*** other IP hosts. Connectivity is confirmed by receiving a reply from the remote (pinged) IP host.

➤ To ping a host:

1. From the Diagnostic Tools menu, type **1** and enter the desired host IP address.
2. Press **<Enter>** to confirm the destination IP address.
3. To start pinging, type **2** on the Diagnostic Tools screen.

   After pinging starts, you can monitor the ***ping*** status. A typical screen is shown in *Figure D-27*.

Note *After pinging is started, it continues in the background even if you exit the Diagnostics Tools screen. In this case, a Ping Running message appears in the top upper left-hand corner of the screen.*

4. To stop pinging, type **3** from the Diagnostic Tools menu.

   A **Ping Stopped** message is displayed.
   To clear the message and return to the Diagnostic Tools screen, press any key.

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)
=====================================================================
     1. Ping IP Address                                  :192.168.100.011
     2. Start Pinging                                    :>>>
     3. Stop Pinging                                     :>>>

Pinging 192.168.212.001 Sent 27 Recvd 25  Lost 2  Resp.Time 60 ms


Press one of the numbers to select or ESC:
```

Figure D-27. Diagnostic Tools Menu after Receiving Pinging Response

D.13 Erasing User's Configuration

The user-defined configuration parameters are stored in the IP router card flash memory. After the user-defined configuration parameters are erased, the IP router card automatically loads the default parameters.

You may want to erase the current configuration parameters:

1. Before IR-IP is prepared for operation in a new application.
2. When you cannot configure IR-IP because its current LAN-interface IP address and/or the Telnet password, are not known.

➤ To erase the user's configuration:

1. Turn ASM-40 off.
2. Set all the four sections of the IR-IP DIP switch to ON.
3. Turn ASM-40 on and monitor the ERR indicator: it must turn on and start blinking.
4. While the ERR indicator is blinking (within 15 seconds), set sections 1 and 2 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 1 and 2 to OFF within 15 seconds of power-up, the IP router card ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn ASM-40 off and then back on.

To abort the whole operation, turn ASM-40 off, return all the four-switch section to the desired positions, and then turn ASM-40 on again.

5. Turn ASM-40 off, and the return all the four sections of the DIP switch to the desired positions.

D.14 Erasing IR-IP Software

You may erase the IR-IP application software, without erasing the user-defined parameters.

After the application software is erased, IR-IP starts its TFTP server application, and waits for the downloading of software by a TFTP client connected to its LAN interface. The procedure to be used to download the application software in this case is also described below.

You may want to erase the application software if the downloading of new software using the Device Control menu (see *Figure D-17*) fails, and IR-IP does not function properly.

Erasing Application Software

➤ To erase the application software:

1. Turn ASM-40 off.
2. Set all the four sections of IR-IP DIP switch to ON.
3. Turn ASM-40 on and monitor the IP router ERR indicator: it must turn on and start blinking.
4. While the ERR indicator is blinking (within 15 seconds), set sections 3 and 4 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 3 and 4 to OFF within 15 seconds of power-up, IR-IP ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn ASM-40 off and then back on.

Alternately, to abort the whole operation, turn ASM-40 off, return all the four switches to the desired positions, and then turn ASM-40 on again.

5. Turn ASM-40 off, and the return all the four sections of the DIP switch to the desired positions.

Downloading New Software

After erasing the application software, you can download new software from any computer that can serve as a TFTP client.

To enable the downloading, IR-IP automatically activates its TFTP server application with the following factory-default IP parameters:

- IP address: 192.168.205.1
- Subnet mask: 255.255.255.252.

Connect the computer serving as a TFTP client to the IR-IP 10BASE-T connector in the way as a Telnet host used for preliminary configuration (see the *Performing Preliminary Configuration* section). The computer IP parameters must be configured as follows:

- IP address 192.168.205.2
- Subnet mask 255.255.255.252
- Default gateway 192.168.205.1

➤ **To download new software:**

1. If necessary, turn ASM-40 off.
2. Set all the four sections of the IR-IP DIP switch to OFF.
3. Turn ASM-40 on and monitor the ERR indicator: it must start flashing.
4. Connect the computer to the IP router LAN interface and configure its IP parameters as explained above.
5. Run a standard TFTP client application on the Telnet host, and download the appropriate software file.

   If the download is successful, IR-IP starts using the new software.

   If the downloading fails, repeat the download process.

Appendix E

IR-G.703 Interface Module

E.1 Introduction

IR-G.703 is an interface module for RAD modems, converting G.703 64 kbps codirectional signals to TTL levels. The converted data is sent over the modem link using the modem modulation technique and converted back at the other end into G.703 64 kbps codirectional signals, or into any other digital interface signal possible.

Note *For the G.703 codirectional interface, end-to-end byte synchronization is not maintained. A violation bit is inserted every eight bits, but the bit does not appear in the same location at the remote side.*

The module is available in the following two versions:

- Standalone version, which fits into a standalone modem and is available with two types of physical connections: a terminal block or an RJ-45 (see *Table E-1* for the RJ-45 connector pinout).
- Rack version, which is mounted on the ASM-40/R modem card and uses the modem edge connector for communication. The edge connector is wired, on the motherboard of the card cage, to the DB-25 connector on the back plane of the ASM-MN-214 card cage (see *Appendix A* for the DB-25 connector pinout).

Figure E-1 illustrates the rear panel of the ASM-40 modem equipped with the IR-G.703 interface module.

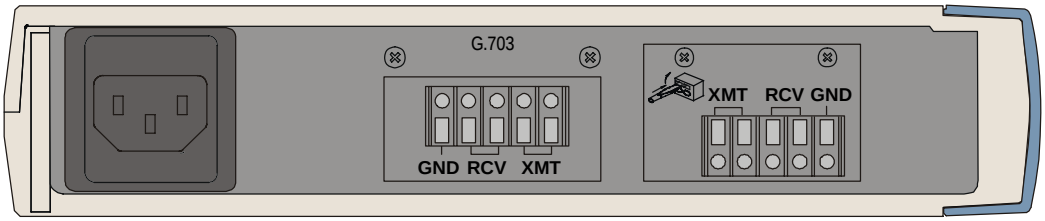

Figure E-1. Rear Panel of ASM-40 with IR-G.703 Module and Terminal Block Connector

Table E-1. RJ-45 Connector Pinouts

Pin	Function
3	RCV (+)
6	RCV (-)
4	XMT (+)
5	XMT (-)
2	GND

E.2 Selecting the IR-G.703 Timing

The IR-G.703 interface module can operate with EXT or INT/RCV timing to match the clock reference of the ASM-40 modem. The clock selection is made via the JP1 jumper located on the module board (see *Figure E-2*).

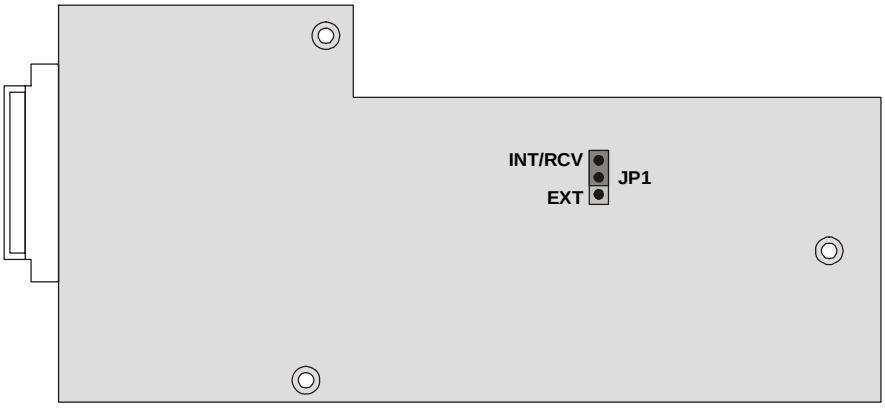

Figure E-2. JP1 Location on the IR-G.703 Board

EXT Timing

The EXT clock is used in applications, where the system timing is provided by the G.703 network. The IR-G.703 module has an internal buffer to compensate for the phase delay introduced to the system by the line delay between the two modems. The buffer is an 8-bit FIFO connected as shown in *Figure E-3*.

You must configure the IR-G.703 module to the EXT clock if the ASM-40 modem is also set to the external timing.

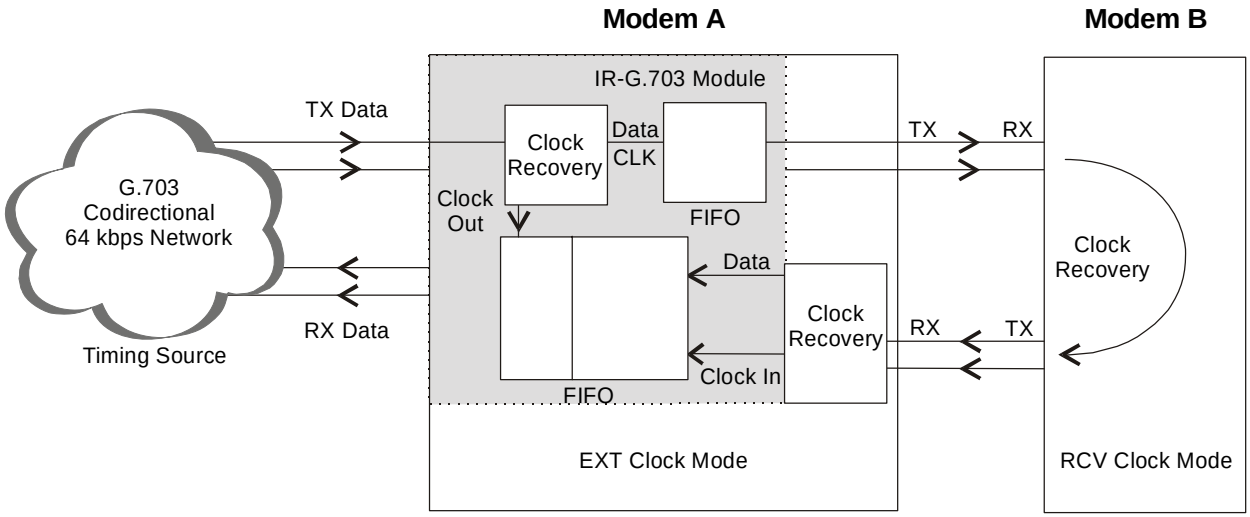

Figure E-3. IR-G.703 EXT Timing

INT/RCV Timing

The INT/RCV clock is used in applications where the G.703 codirectional 64 kbps equipment connected to the modem recovers the clock signal from the modem link. This mode is used mainly when the attached equipment has a G.703 codirectional interface, but is not able to produce clock signals. The module has an 8-bit FIFO buffer to compensate for the phase delay introduced by the G.703 device. *Figure E-4* illustrates the buffer connection and the required application setup.

You must configure the IR-G.703 module to the INT/RCV clock if the ASM-40 modem is set to the internal or receive timing.

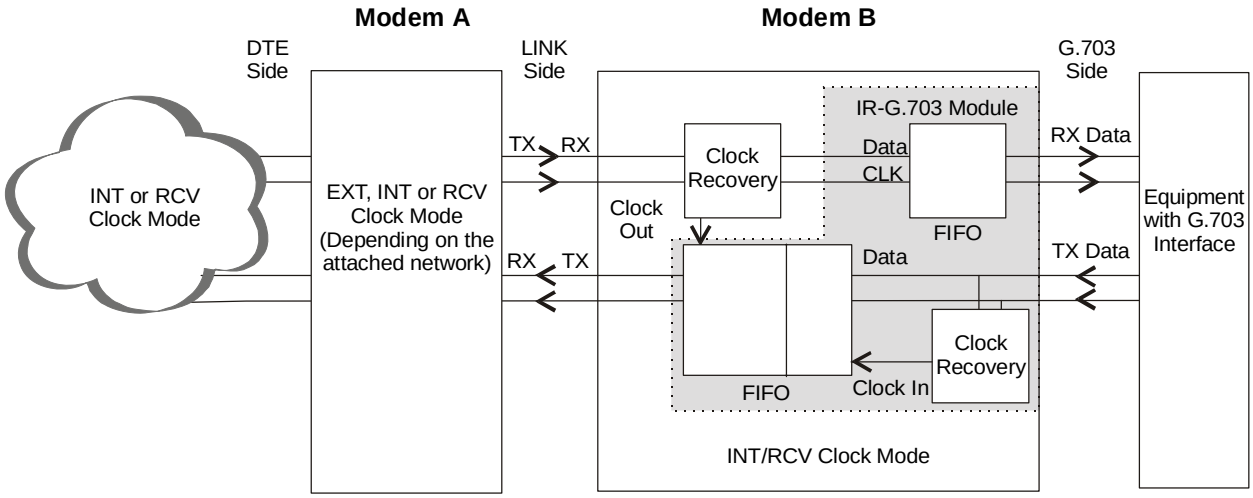

Figure E-4. IR-G.703 INT/RCV Timing

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